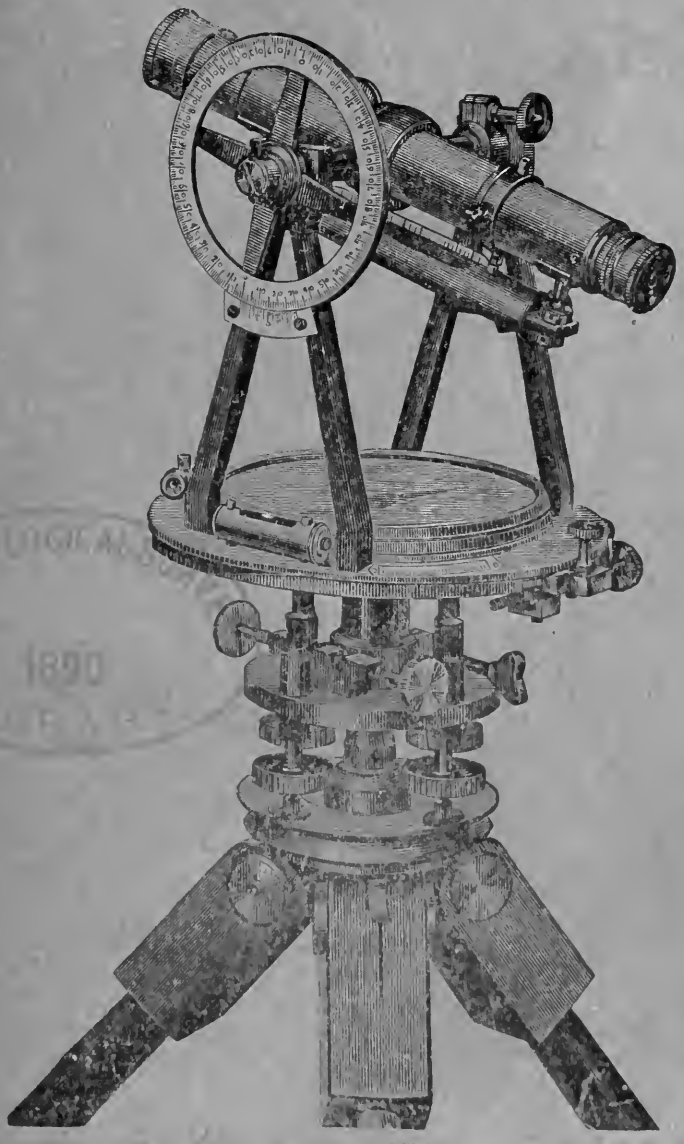
PRICED AND ILLUSTRATED CATALOGUE

AND DESCRIPTIVE MANUAL OF

MATHEMATICAL INSTRUMENTS & MATERIALS

FOR

DRAWING, SURVEYING AND CIVIL ENGINEERING.



MADE, IMPORTED AND SOLD, WHOLESALE AND RETAIL,

BY

G. S. WOOLMAN,

116 FULTON STREET, NEW YORK.

1890.

NOTICE.

HAVING disposed of our New York business to Mr. GEORGE S. WOOLMAN, our former Manager, and for many years connected with our house in this city, we take this opportunity of returning thanks to our friends, for their liberal patronage, and to ask for our successor a continuance of the same.

Respectfully,

JAMES W. QUEEN & CO.

PHILADELPHIA, FEB. 1st, 1876.

116 FULTON STREET, NEW YORK, FEB. 1st, 1876.

DEAR SIR

HAVING this day purchased of Messrs. JAMES W. QUEEN & Co. the stock, fixtures and good will of their business, hitherto carried on at 601 Broadway, I have removed the same to the above address, where I am prepared to receive and execute all orders as heretofore. Being the only authorized agent of QUEEN & Co. in New York, I shall at all times carry in stock a full line of their manufactures and importations.

All packing boxes will be charged for, and all goods will be packed with the utmost care; but no responsibility will be assumed by us for breakage, loss in carriage, or other damage, after a package leaves our premises, except upon special contract.

GEORGE S. WOOLMAN.

NEW YORK, MAY 1, 1877.

N. B.—Liberal discounts to dealers.

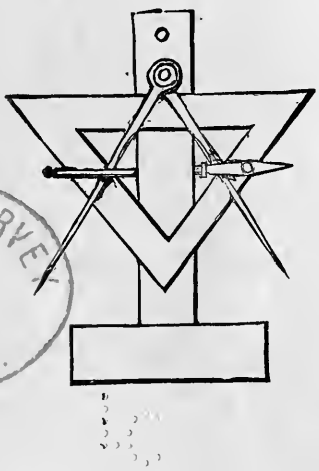
PRICED AND ILLUSTRATED CATALOGUE

OF

MATHEMATICAL INSTRUMENTS

AND

MATERIALS FOR DRAWING, SURVEYING, AND CIVIL ENGINEERING,



MADE, IMPORTED, AND SOLD, WHOLESALE AND RETAIL

BY

G. S. WOOLMAN,

116 FULTON STREET, NEW YORK.

1889.

NOTICE.

TERMS CASH.

The prices throughout the Catalogue will be strictly adhered to.

When no satisfactory Philadelphia or New York reference is given by the party ordering the goods, the money should accompany the order; but where it does not, (either from want of confidence or other cause,) the goods will be forwarded by express, with bill, C. O. D. (collect on delivery), *provided a remittance equal to one-third the total amount of the order is sent with it.*

No order for a less amount than Five Dollars will be sent C. O. D.

The Express Company's charges for collecting and returning the money on C. O. D. bills must be paid by the party ordering the goods.

The safest and most economical method of remitting money is by Bank Draft or Post-Office Order, made payable to us. Where neither of these can be procured, United States or National Bank Notes, or Postage Stamps, can be sent by express with safety, the sender prepaying the express charges.

Goods ordered to be sent by mail must be prepaid, and the return postage or freight included in the remittance.

Packing-boxes will be charged for at reasonable prices, and all goods will be packed with the utmost care; *but no responsibility* will be assumed by us, for *breakage* or other *damage, after* a package *leaves our premises*, except upon special contract.

G. S. WOOLMAN.

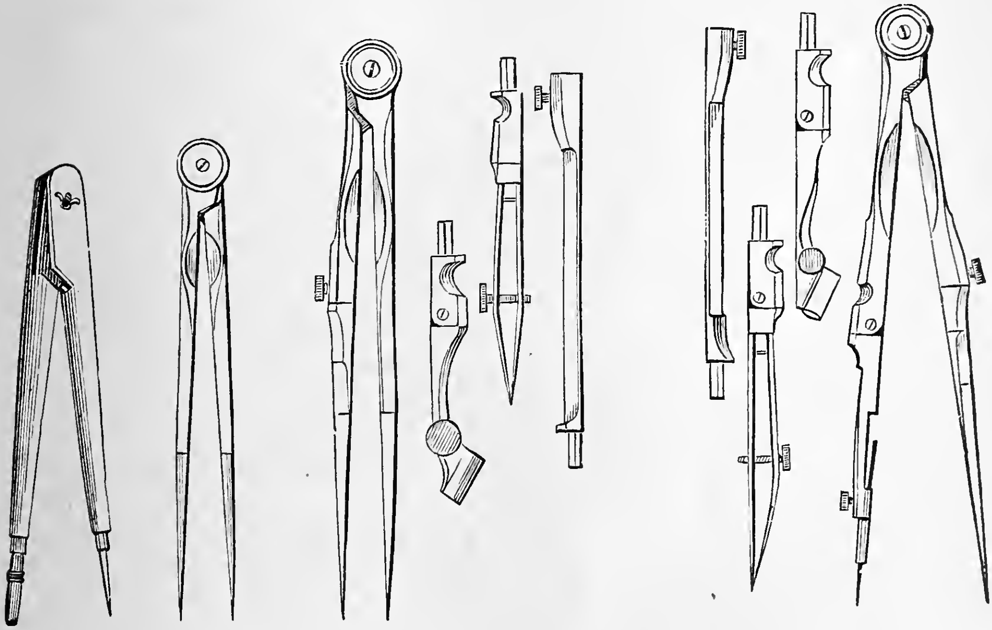
NEW YORK, 1882.

CATALOGUE OF MATHEMATICAL INSTRUMENTS.

CHAPTER I.

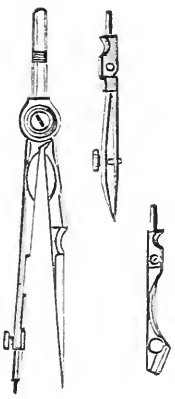
MATHEMATICAL INSTRUMENTS, OF BRASS,

FOR SCHOOLS.



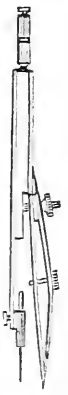
00. 5. 14. 16.

No.		Price.
00.	Wood Dividers, 13 in. long, with crayon holder, for blackboard drawing,	$1.00
0.	Do. 16 do. do. do. do.	1.25
1.	Do. 20 do. do. do. do.	1.50
2.	Do. 24 do. do. do. do.	1.75
3.	Do. 27 do. do. do. do.	2.00
4.	Do. 30 do. do. do. do.	2.25
4½.	Do. 36 do. do. do. do.	2.50
5.	Brass Dividers, 3½ inches long, screw joint, ...	.25
6.	Do. 4½ do. do.	.30
7.	Do. 5½ do. do.	.35
8.	Do. 6½ do. do.	.45
9.	Do. 4½ do. rivet joint, ...	.20
10.	Do. 5½ do. do.	.25
11.	Do. 6½ do. do.	.30
12.	Do. 4½ do. screw joint and pencil leg, ...	.40
13.	Do. 5½ do. do. do.	.50
13½.	Do. 6½ do. do. do.	.60
14.	Brass Dividers, 4½ inches long, with Pen and Pencil Points and Lengthening Bar, ...	.50
15	Brass Dividers, 6 inches long, with Pen and Pencil Points and Lengthening Bar, ...	.75
16.	Brass Dividers, Needle Point, 4½ inches long, with Pen and Pencil Points and Lengthening Bar, ...	.75



18.

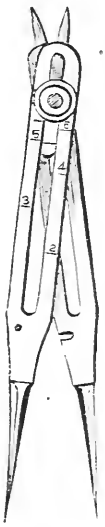
19.



20.

21.

No.		Price.
17.	Brass Dividers, Needle Point, 6 inches long, with Pen and Pencil Points and Lengthening Bar,	$1.00
18.	Brass Dividers, 3 inches long, with Pen and Pencil Points,	.60
19.	Brass Bow Pen, no spring,	.60
20.	Brass Bow Pen, with adjusting screw and spring,	.70
21.	Brass Bow Pencil, no spring,	.60



22.

23.

25.

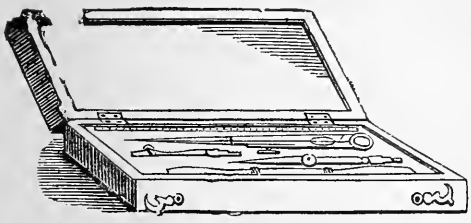
26.

29.

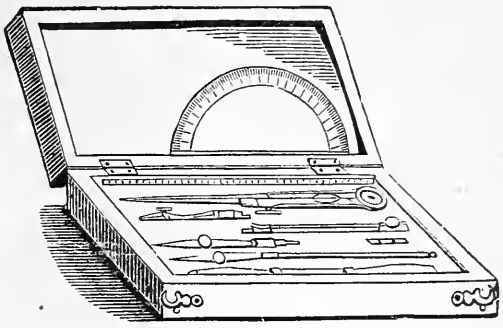
22.	Brass Bisecting Dividers,	.60
23.	Brass Proportional Dividers, divided for lines, in case,	2.00
24.	Drawing Pen, black handle,	.20
25.	Drawing Pen, ivory handle,	.30
26.	Roulette, for dotting lines,	.65
26½.	Do. do. with three wheels,	.85
27.	Tracer, or Copying-wheel, for tracing patterns,	.25
28.	Double Drawing or Railroad Pen, for parallel lines, brass mounted,	2.25
29.	Fox's Patent Lead Holder, for pencil leg of Dividers,	.25

CASES OF BRASS DRAWING INSTRUMENTS,

FOR SCHOOLS.



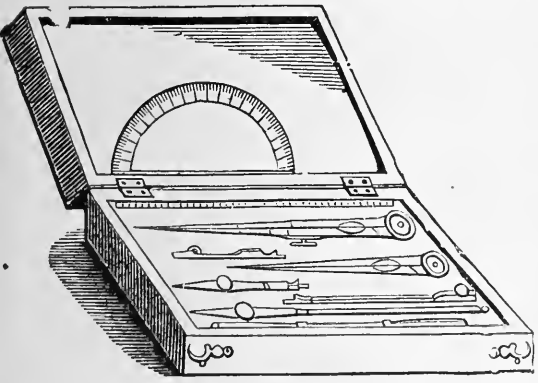
48



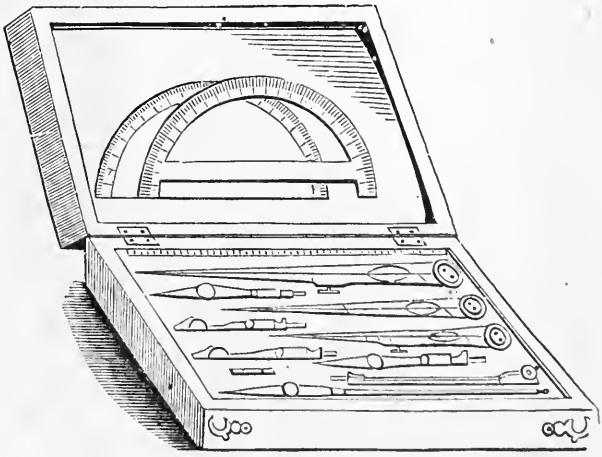
49

All sets of instruments from No. 48 to 64½ are fitted with Fox's Patent Lead Holder, No. 29, when sold at retail.

No.		Price.
48.	Wood Box; containing pair 4½-inch Dividers, with Pen and Pencil Points,	$0.50
49.	Wood Box; containing pair 4½-inch Dividers, with Pen and Pencil Points and Lengthening Bar, No. 14. Ebony handle Drawing Pen, No. 24. Brass Protractor and Divided Rule,	.80



50 and 51.



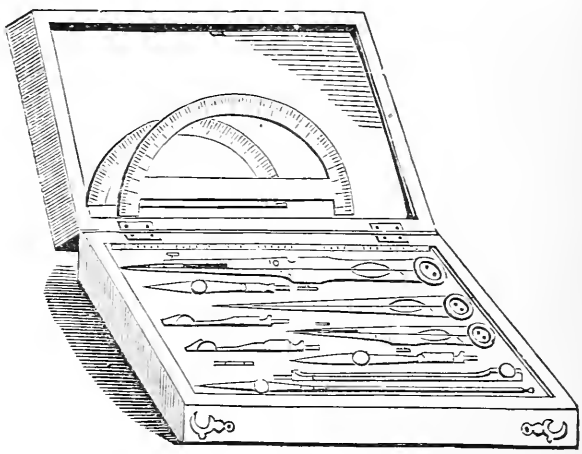
55.

50.	Wood Box; containing pair of 4½-inch Dividers, with Pen and Pencil Points and Lengthening Bar, No. 14. Pair of 3½-inch plain Dividers, No. 5. Drawing Pen, No. 24. Brass Protractor, No. 306. Crayon Holder and Divided Rule,	1.00
51.	Rosewood Box; containing pair of 5½-inch Dividers, with Pen and Pencil Points and Lengthening Bar, No. 15. Pair of 4½-inch plain Dividers, No. 6. Drawing Pen, No. 24. Brass Protractor and Divided Rule,	1.30
52.	Same as No. 51, with Parallel Ruler,	1.50

No. PRICE.

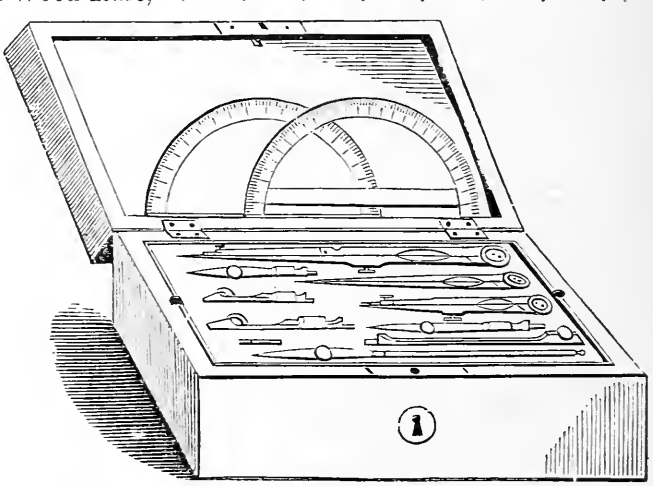
55. Rosewood Box; containing pair of 6-inch Dividers, with Pen and Pencil Points and Lengthening Bar, No. 1 .
Pair of 4½-inch plain Dividers, No. 6.
Pair of 3½-inch Dividers, with Pen and Pencil Points.
Drawing Pen, No. 24.
Brass Protractor, No. 306.
Horn Protractor, No. 301.
Divided Wood Rule, ... $2.00

56. Same as No. 55, but with the instruments set in a tray, so that colors, etc., may be put below, ... 2.25



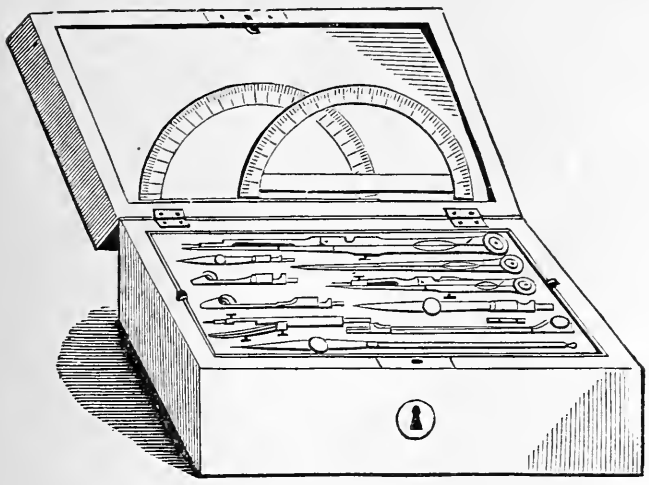
57.

57. Rosewood Box; containing pair of 6-inch Needle-point Dividers, with Pen and Pencil Points and Lengthening Bar, No. 17.
Pair of 4½-inch plain Dividers, No. 6.
Pair of 3½-inch Needle-point Dividers, with Pen and Pencil Points.
Drawing Pen, No. 24.
Brass Protractor, No. 306.
Horn Protractor, No. 301.
Divided Wood Rule, ... 2.75



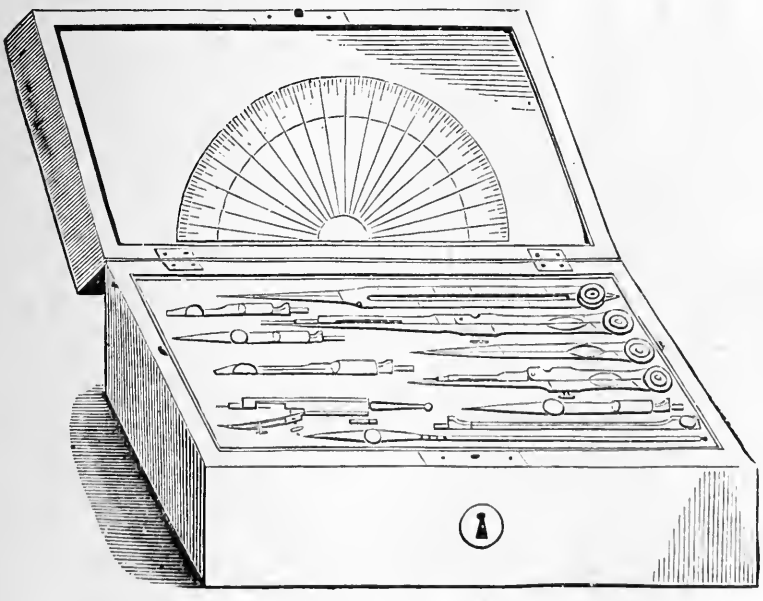
58.

58. Same as No. 57, but with lock and key, and the instruments set in a tray so that colors may be put below, ... 3.00



62.

No.		Price.
62.	Rosewood Box, with lock and key, the instrument set in a tray, so that colors, etc., may be put below, containing: Pair of 6-inch Needle-point Dividers, with Pen and Pencil Points and Lengthening Bar, No. 17. Pair of 4½-inch plain Dividers, No. 6. Pair of 3½-inch Needle-point Dividers, with Pen and Pencil Points. Spring Bow Pen, with Needle Point, No. 20. Drawing Pen, No. 24. Brass Protractor, No. 306. Horn Protractor, No. 301. Divided Wood Rule, ...	$4.00



64.

64.	Same as No. 62, with the addition of a pair of Proportional Dividers; has no brass Protractor, but has wood Triangle and Irregular Curves, .	6.00

CHAPTER II.

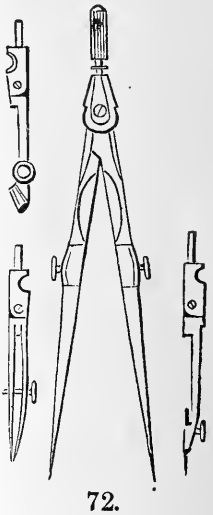
MATHEMATICAL INSTRUMENTS OF GERMAN SILVER,

FOR ACCURATE DRAFTING.

65.

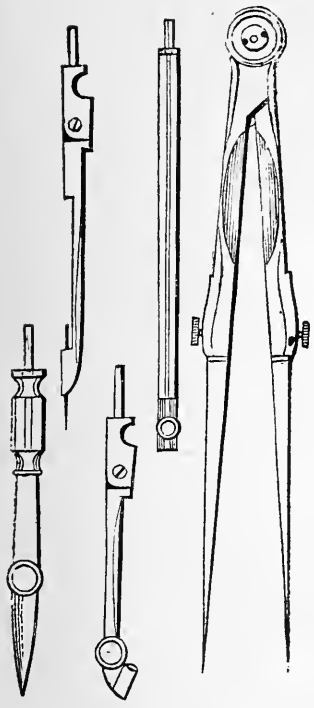
69.

71½.

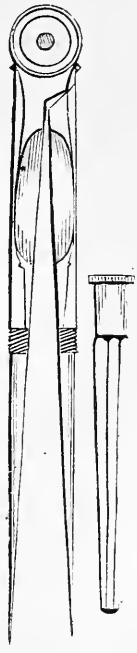


72.

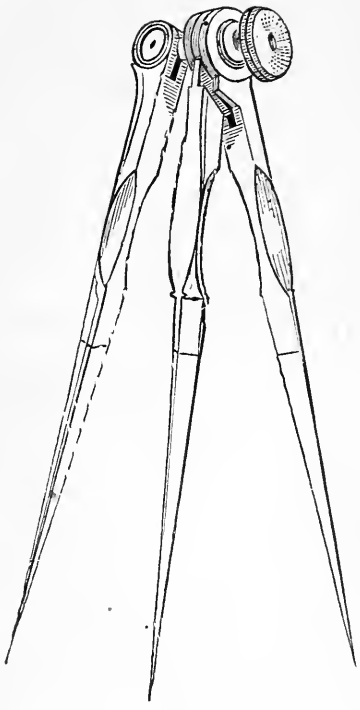
No.							Price
65.	Dividers, German silver,	4	inches long,	steel joints,			$0.60
66.	Do.	do.	5	do.	do.		.70
67	Do.	do.	6	do.	do.		.90
69.	Do.	do.	4	do.	do.	with hair spring,	1.00
70.	Do.	do.	5	do.	do.	do.	1.50
71.	Do.	do.	6	do.	do.	do.	2.00
71½.	German silver Plain Dividers, 3 inches long, with handle,						.60
72.	Dividers, German silver, 3 inches long, with Pen, Pencil, and Needle Points,						2.25



73.

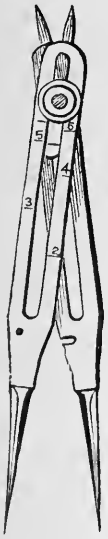


74.

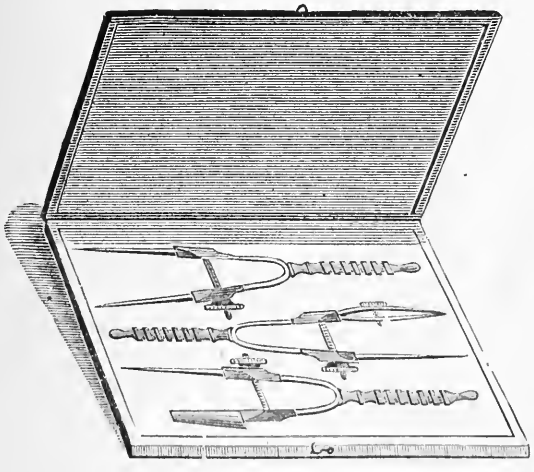


75.

No.		PRICE.
73.	Dividers, German silver, 6 inches long, steel joints, with Pen, Pencil and Needle Points and Lengthening Bar,	$3.00
74.	Dividers, German silver, 5 inches long, steel joints, with shield for pocket,	1.50
75	Dividers, German silver, 5 inches long, steel joints, with three legs,	3.50



75½.



77.

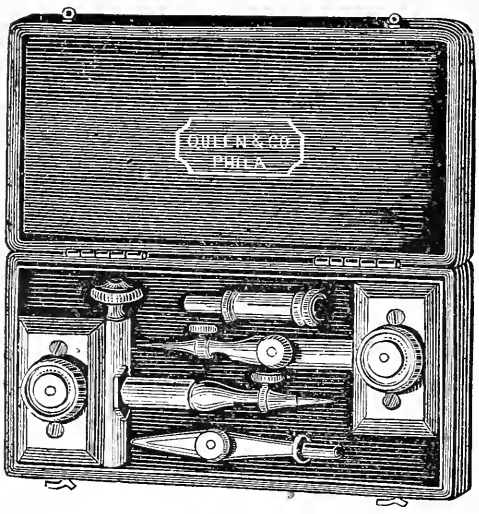
77½

78.

78½.

79.

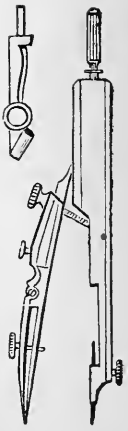
75½.	Proportional Dividers, German silver, 6½ inches long, divided for lines,	2.50
77.	Bisecting Dividers, German silver,	1.12
77½.	Set of three Steel Bows, Pen, Pencil, and Dividers, in box, . per set,	4.95
77¾.	Same as 77½, but finer finish and Needle Points, . . . do.	6.75
78.	Spacing Dividers, all steel, with Spring and Adjusting Screw,	1.00
78½.	Fox's Patent Lead Holder, for pencil leg of Dividers,	.25
79.	Pocket Dividers, German silver, with Folding Pen and Pencil Points,	5.50



80.

81.

82.



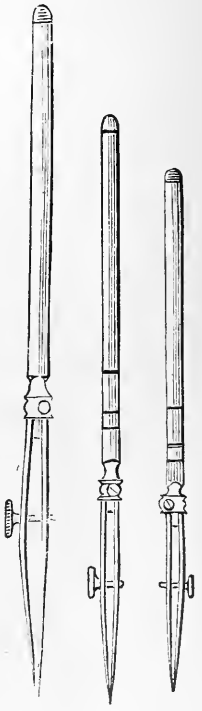
83.

No.		Price.
80.	Furniture for Beam Compasses, German silver, with Adjusting Screw, in morocco case,	$5.00
81.	Bow Pen, all steel, with Spring and Adjusting Screw,	1.50
82.	Bow Pen, German silver, with Spring and Adjusting Screw,	1.50
83.	Bow Pen, German silver, with Pencil Point,	2.10

84.

85.

86.



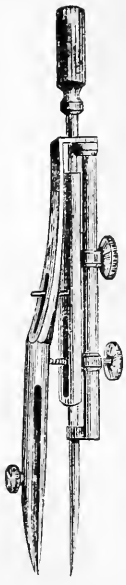
89.

92.

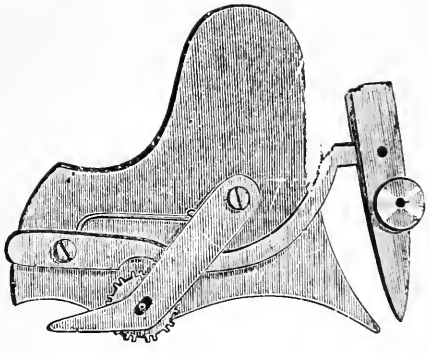
84.	Bow Pencil, all steel,	1.40
85.	Drawing Pen for curves,	1.50
86.	Do. for heavy border lines,	2.50
87.	Do. 4 to 6 inches long, medium finish, hinge to Pen,	.40
88.	Do. 4 to 6 inches long, fine finish, hinge to Pen,	.50
89.	Do. 4 to 6 inches long, German silver, fine finish, hinge to Pen, and Protracting Pin,	.75

91¾.

93.



96.



98.

98.

No.		Price.
91	German silver, fine finish; hinge to pen. German silver Points, for red ink,	$0.70
91¾.	Queen's Improved Drawing Pen, having the screw graduated and the upper blade made to spring, so that it can be readily cleaned, each,	1.75
92.	Double Drawing Pen,	2.25
93.	Patent Double Drawing Pen. Will draw with one stroke one broad or two parallel lines of the same or different widths, each,	3.75
94.	Roulette for dotting lines,	.75
95.	Map Perambulator, for measuring the length of curved lines, rivers, roads, etc., on maps, each,	1.50
96.	Improved Bow Pen. The needle-point in this instrument being adjustable, it will draw extremely minute circles,	3.00
97.	Improved Bow Pen, same as No. 96, with pencil point,	4.50
98.	Dotting Pen, with extra wheels,	3.75

This instrument answers the purpose of making dotted lines better than any other yet made. It consists of a small, conveniently shaped German silver plate, upon which is fastened a Pen, connected by a small bar, and a ratchet movement with a rolling wheel. The bar is kept in its place by a small spring. Extra wheels of dif

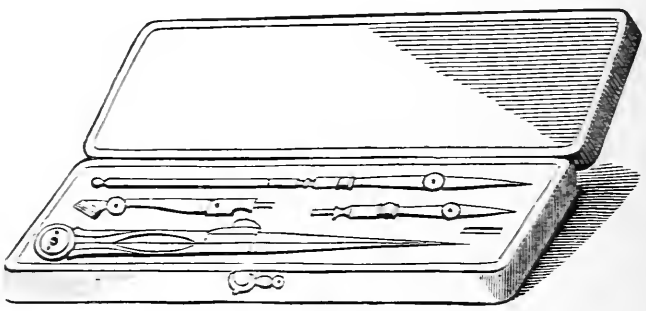
ferent patterns accompany the instrument, which, being readily changed, allow the making of various forms of lines. In using the instrument, care should be taken that the small point behind the pen rests on the paper, as it secures evenness in the stroke of the pen.

☞ *For Boxwood and Ivory Scales, Protractors, etc., etc., see pages 38 to 41.*

Parties wishing cases made up of these Instruments, can select the pieces, by the above list, that are best adapted to their purpose, and we will have boxes made to suit, at an additional cost of from $5 to $12, according to the sizes of the boxes, which are made of rosewood, mahogany or walnut, highly finished.

CASES OF FINE GERMAN SILVER INSTRUMENTS,

FOR ENGINEERS, ARCHITECTS, AND MACHINISTS.

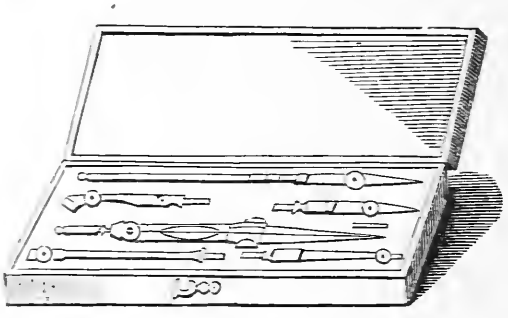


100.

All sets of instruments from No. 100 to 134½ fitted with Fox's Patent Lead Holder, No. 78½, when sold at retail.

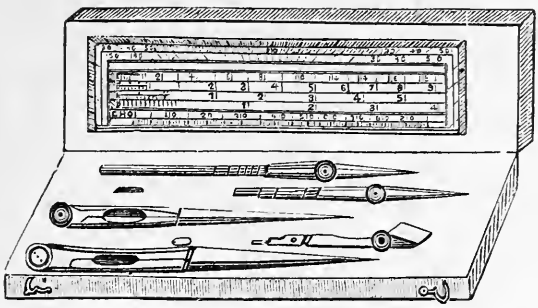
No. PRICE.

100. Morocco Box: containing pair of 5½-inch Dividers, with Pen and Pencil Points.
Drawing Pen, No. 88, ... $3.00



101.

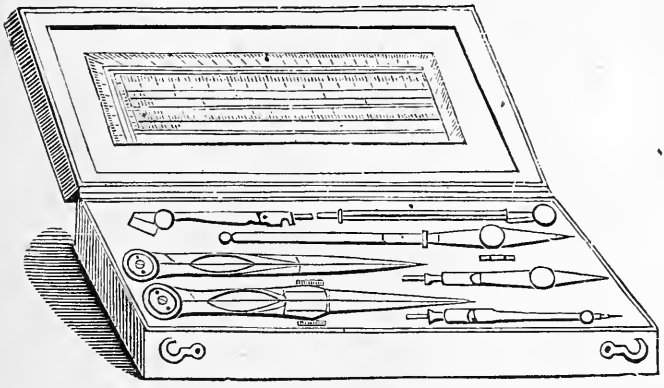
101. Morocco Box: containing pair of 3-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar, No. 72.
Drawing Pen, No. 89, Pencil Point, ... 4.25



102.

No. PRICE

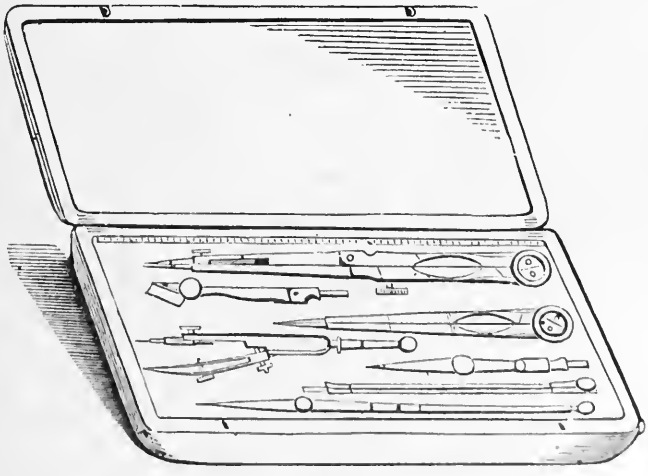
102. Morocco Box; containing pair of 5½-inch Dividers, with Pen and Pencil Points,
Pair of 5-inch Plain Dividers, No. 66.
Drawing Pen, No. 88, ... $3 25



103.

103. Morocco Box; containing pair Dividers 6 inches long, with Pen, Pencil, and Needle Point and Lengthening Bar, No. 73.
Pair plain Dividers, 5 inches long, No. 66.
Drawing Pen, No. 89, ... 4.50

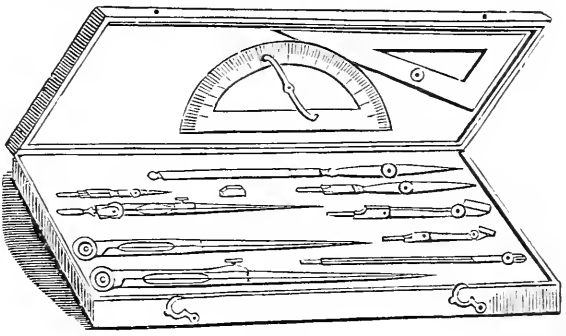
103½. Same as No. 103, but with Polished Walnut Box, with lock and key and tray, ... 7.00



104.

No. PRICE.

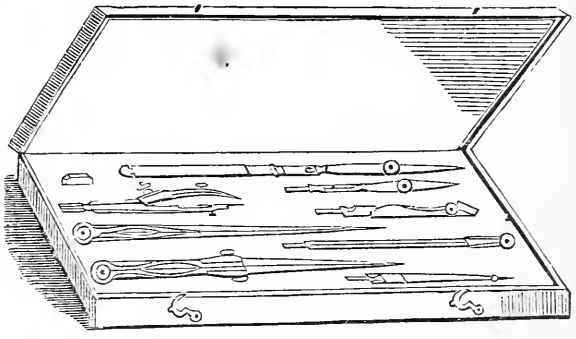
104. Morocco Box, rounded corners, for carrying in the pocket; containing pair of 4¾-inch Dividers, with Hinge in one Leg, Needle Points, with Pen and Pencil Points and Lengthening Bar.
Pair 4-inch plain Dividers, rounded points.
Spring Bow Pen, Needle Point.
Drawing Pen, Ivory Handle.
5-inch Ivory Rule, divided to eighths, ... $7.00



105.

105. Morocco Box; containing pair 5½-inch Dividers, with Pen and Pencil Points and Lengthening Bar.
Pair of 5-inch plain Dividers, No. 66.
Pair 3-inch Dividers, with Pen and Pencil Points.
Drawing Pen, No. 89.
German silver Protractor, No. 311.
German silver, or rubber Square, ... 8.00

105½. Same as No. 105, but with Polished Walnut Box, with lock and key and tray, ... 10.00

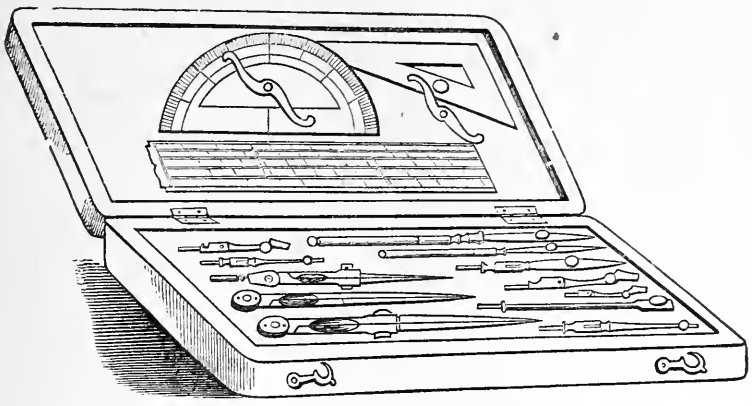


106.

106. Morocco Box; containing pair of 5½-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar, No. 73.
Pair 5-inch plain Dividers, No. 66.
Spring Bow Pen, No. 82.
Drawing Pen, No. 89, ... 6.00

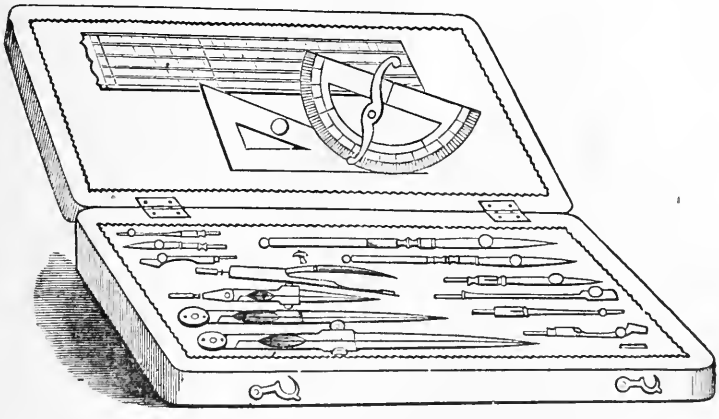
106½. Same as No. 106, in Polished Walnut Box, with lock and key and tray, 8.50

106¾. Morocco Box; containing pair 6-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar, No. 73.
Pair 5-inch plain Dividers, No. 66.
Pair Spacing Dividers, No. 78.
Bow Pen, No. 81.
Bow Pencil, No. 84.
Drawing Pen, No. 88, ... 9.50



107.

No.		Price.
107.	Morocco Box; containing pair of 5½-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar, No. 73. Pair of 5-inch plain Dividers, No. 66. Pair of 3-inch Dividers, with Pen, Pencil, and Needle Point, No. 72. 2 Drawing Pens, No. 89. German silver Protractor, No. 310. German silver or rubber Square, ...	$9.00
108.	Same instruments as No. 107, in Polished Walnut Box, with lock and key and tray, ...	11 00

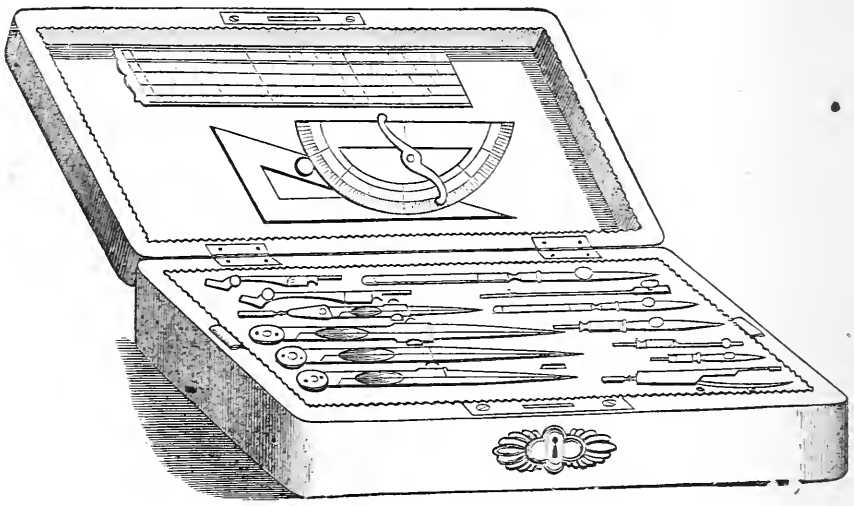


109.

109.	Polished Walnut Box; containing pair of 5½-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar, No. 73. Pair 5-inch plain Dividers, No. 66. Pair of 3-inch Dividers, with Pen, Pencil, and Needle Points, No. 72. Spring Bow Pen, with Needle Point, No. 82. 2 Drawing Pens, No. 89. German silver or rubber Square. German silver Protractor, No. 310, ...	11.75
109½.	Same as No. 109, in Polished Walnut Box, with lock and key and tray, ...	12.75

No. PRICE.

110. Polished Walnut Box; containing pair 5½-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar, No. 73.
Pair of 5-inch plain Dividers, No. 66.
Pair of 5-inch Hair Spring Dividers, No. 70.
Pair of 3-inch Dividers, with Pen, Pencil, and Needle Points, No. 72.
Spring Bow Pen, with Needle Point, No. 82.
2 Drawing Pens, No. 89.
German silver or rubber Square.
German silver Protractor, No. 310, ... $14.00

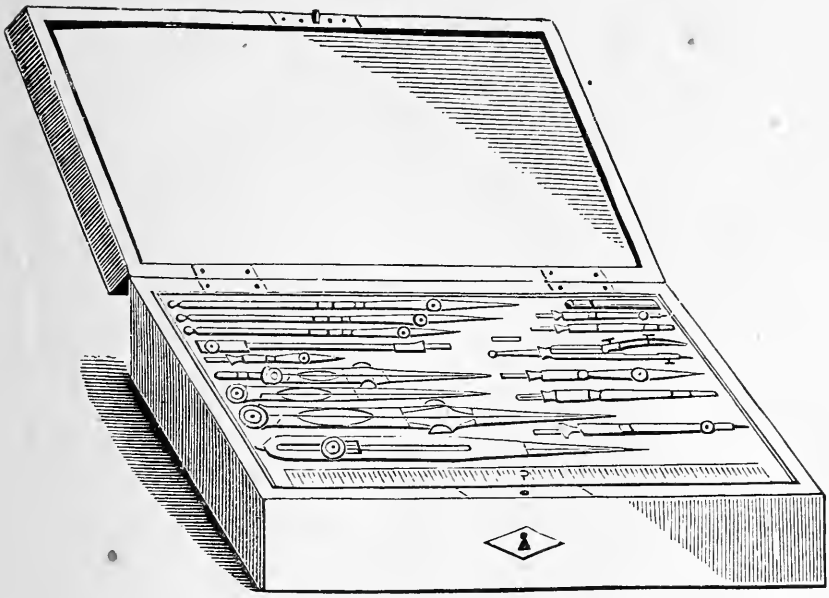


111.

111. Same instruments as No. 110, set in a tray, and box with lock and key, thus affording space for extra instruments or colors, . . . 14.50

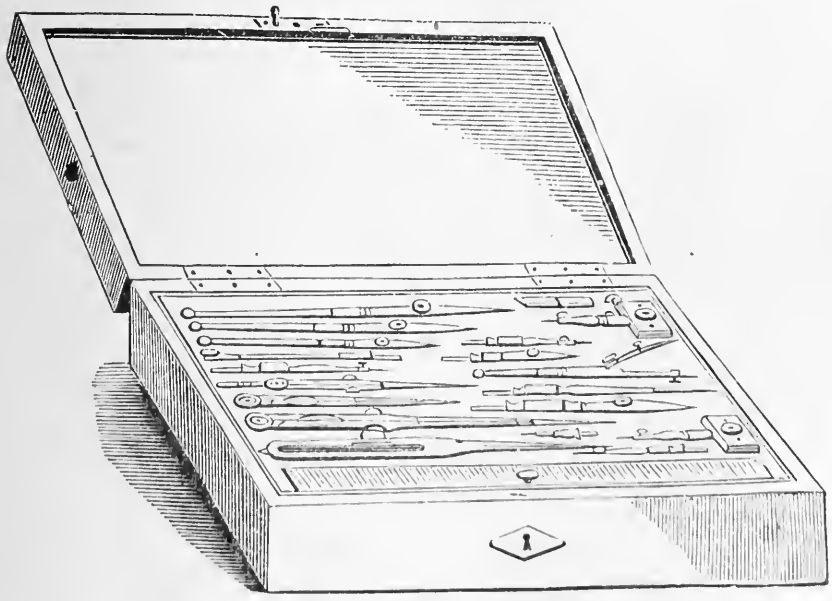
112. Polished Walnut Box, with lock and key and tray; containing pair 6-inch Dividers, with Pen, Pencil, and Pen Point and Lengthening Bar, No. 73.
Pair 5-inch plain Dividers, No. 66.
Pair 5-inch Hair Spring Dividers, No. 70.
Pair 3-inch Dividers, with Pen, Pencil, and Needle Point, No. 72.
Bow Pen, No. 82.
2 Drawing Pens, No. 89.
1 Red Ink Pen, No. 91.
1 Road Pen, No. 93.
Pair Proportional Dividers, No. 75½.
Protractor, No. 311.
Triangle, No. 565.
Triangular Scale, No. 463 or 466, ... 24.50

113. Same as No. 112, with addition of Beam Compass, No. 80, . . 31.00



114.

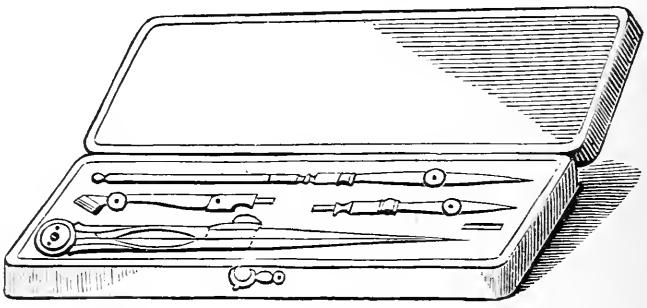
No.		Price.
114.	Polished Rosewood Box, inlaid, lock and key, with tray, leaving space below for paints, rules, etc.; containing pair 6½-inch Needle-point Dividers, with Pen and Pencil Points and Lengthening Bar. Pair of 4½-inch plain Dividers. Pair of 4-inch Needle-point Dividers, with Pen and Pencil Points. Pair of 7-inch Proportional Dividers. 3 Drawing Pens. Horn Protractor. 1 Wood Curve and 2 Wood Squares. Spring Bow Pen. Ivory Rule, 8 inches long, ...	$27.00



116.

116. Polished Rosewood Box, inlaid, with brass edges, lock and key, with tray, leaving space below for paints, rules, etc.; containing pair of 6-inch Needle-point Dividers, with Pen and Pencil Points and Lengthening Bar.
Pair of 4½-inch Dividers, rounded points.
Pair of 4-inch Dividers, Needle Points, with Pen and Pencil Points.
Pair of 7½-inch Proportional Dividers.
Spring Bow Pen, Needle Point.
3 Drawing Pens.
Furniture for Beam Compass, with Micrometer Screw.
9-inch Horn Protractor.
Ivory Scale, 8 inches long, one edge divided to inches and eighths, the other to centimeters and millimeters, ... $34.00

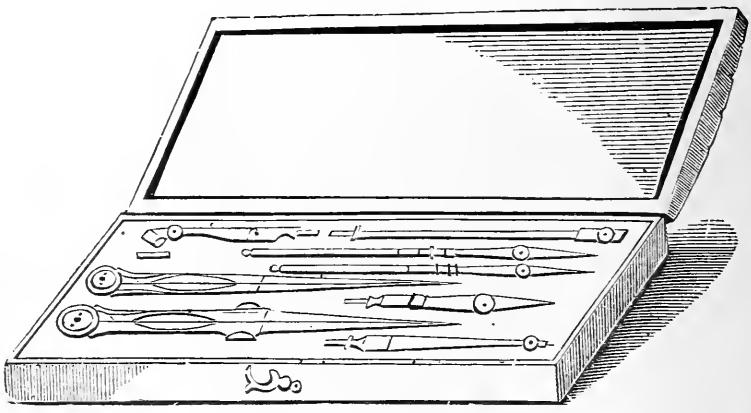
CASES OF SECOND QUALITY GERMAN SILVER INSTRUMENTS.



125.

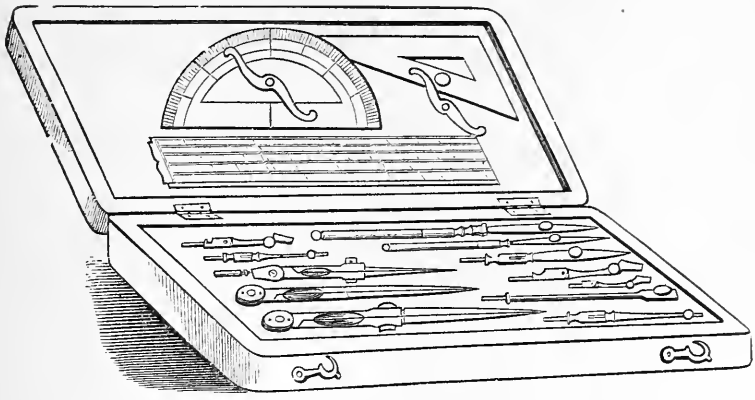
124. Morocco Box; containing pair of 5½-inch Dividers, with Pen and Pencil Points.
Drawing Pen, ... 2.00

125. Morocco Box; containing pair of 5¼-inch Dividers, with Pen and Pencil Points and Lengthening Bar.
Pair of 5-inch plain Dividers.
Drawing Pen, ... 3.00



127.

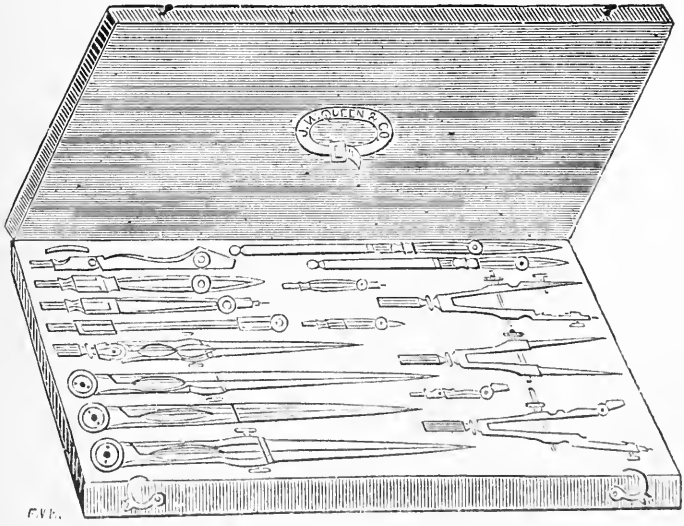
127. Morocco Box; containing pair of 5¼-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar.
Pair of 5-inch plain Dividers.
2 Drawing Pens, ... 4.00



128.

No. PRICE.

128. Morocco Box; containing pair of 5¼-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar.
Pair of 5-inch plain Dividers.
Pair of 4-inch Dividers, with Pen, Pencil, and Needle Points.
2 Drawing Pens, ... $6.50

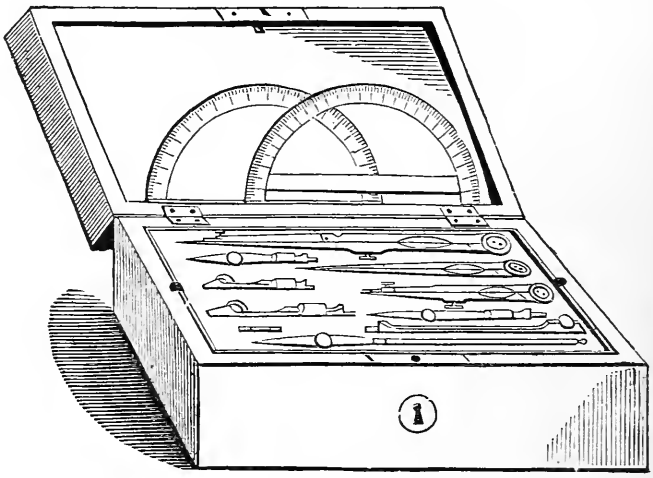


130.

129. Morocco Box; containing pair of 5½-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar.
Pair of 5-inch plain Dividers.
Pair of 4-inch Dividers, with Pen, Pencil, and Needle Points.
Pair Spacing Dividers.
Bow Pen.
Bow Pencil.
2 Drawing Pens, ... 10.00

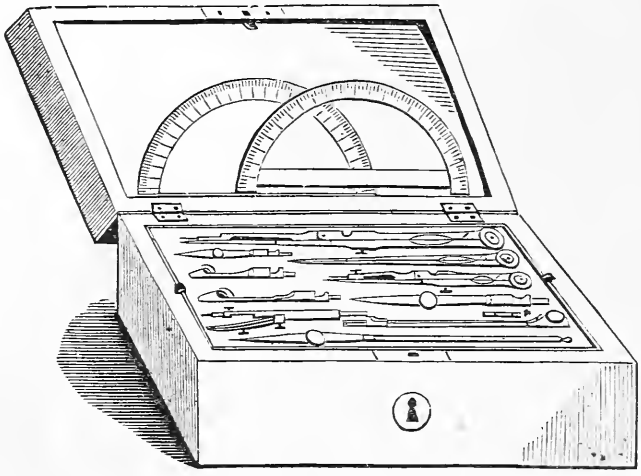
No. PRICE.

130. Morocco Box; containing pair 5½-inch Dividers, with Pen, Pencil, and Needle Points and Lengthening Bar.
Pair 5-inch plain Dividers.
Pair 5-inch Hair-spring Dividers.
Pair 4-inch Dividers, with Pen, Pencil, and Needle Points.
Pair Spacing Dividers.
Bow Pen.
Bow Pencil.
2 Drawing Pens, ... $12.50



132.

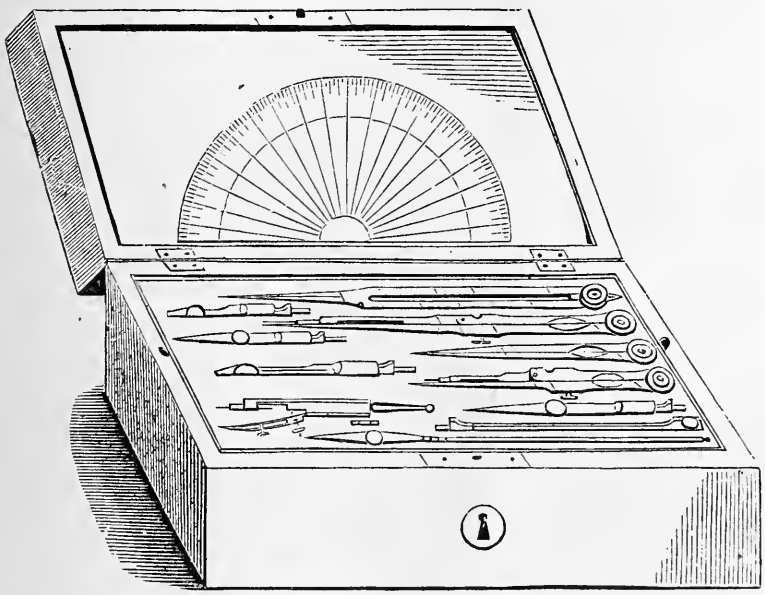
132. Rosewood Box, with lock and key and the instruments set in a tray, so that colors, etc., may be put below; containing pair of 6-inch Needle-point Dividers, with Pen and Pencil Points and Lengthening Bar.
Pair of 4½-inch plain Dividers.
Pair of 3½-inch Needle-point Dividers, with Pen and Pencil Points.
Drawing Pen.
Brass Protractor.
Horn Protractor, ... 6.75



133.

No. PRICE

133. Rosewood Box, with lock and key, the instruments set in a tray, so that colors, etc., may be put below; containing pair of 6-inch Needle-point Dividers, with Pen and Pencil Points and Lengthening Bar.
Pair of 4½-inch plain Dividers.
Pair of 3½-inch Needle-point Dividers, with Pen and Pencil Points.
Spring Bow Pen, with Needle-point.
Drawing Pen.
Brass Protractor.
Horn Protractor, ... $7.50



134.

134. Rosewood Box, with lock and key, the instruments set in a tray, so that colors, etc., may be put below; containing pair of 6-inch Needle-point Dividers, with Pen and Pencil Points and Lengthening Bar.
Pair of 4½-inch plain Dividers.
Pair of 3½-inch Needle-point Dividers, with Pen and Pencil Points.
Spring Bow Pen, with Needle Point.
Drawing Pen.
German silver Protractor.
Horn Protractor.
Irregular Curve of Wood.
2 Triangles of Wood.
Pair Proportional Dividers, 7½ inches long, ... 10.75

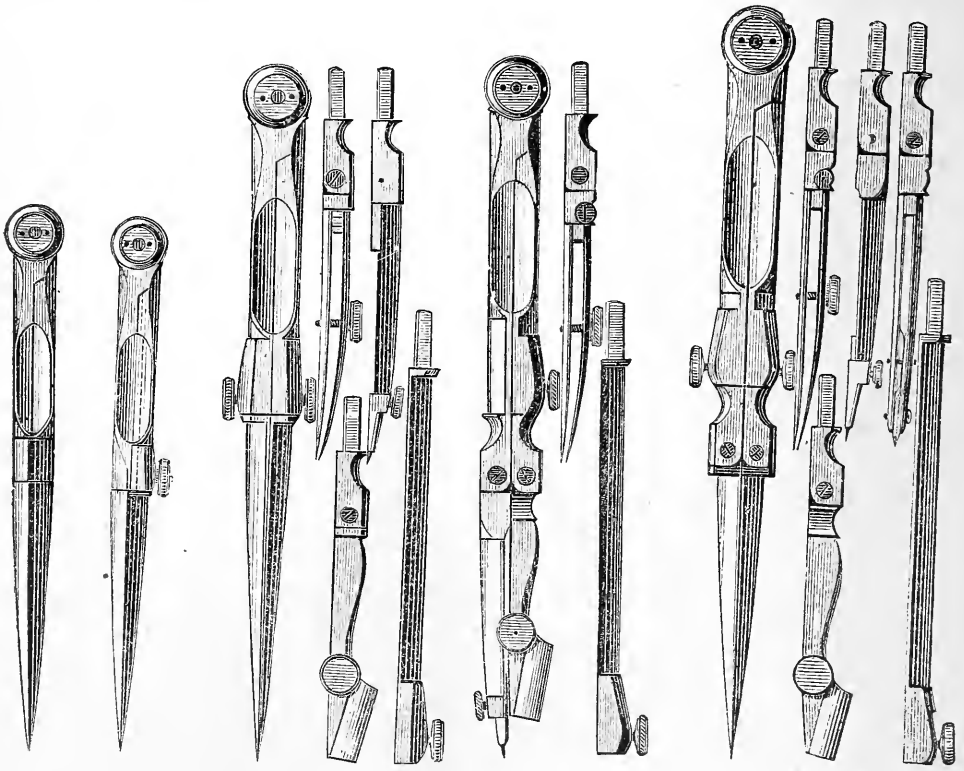
CHAPTER III.

JAMES W. QUEEN & CO. ARE SOLE AGENTS BY APPOINTMENT IN PHILADELPHIA, AND PRINCIPAL AGENTS IN THE UNITED STATES, FOR THE

CELEBRATED SWISS DRAWING INSTRUMENTS.

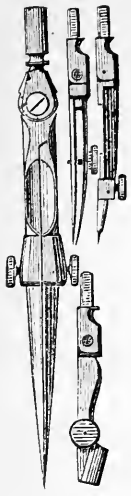
Although there are several makers of drawing instruments in Switzerland, yet there is but one manufacturer whose instruments uniformly come up to a standard of absolute perfection in quality of material and excellence of finish. The divider joints work regularly and smoothly, the points are carefully tempered and rounded, the pens dressed to draw a smooth line of any thickness in whatever position held.

Other Swiss manufacturers imitate the form of these instruments, but cannot imitate their perfection in finish.



145. 148. 150. 151. 152.

No.		Price.
145.	Plain Dividers, 4½ inches long, each,	$1.50
146.	Plain Dividers, 5 inches long, each,	1.75
147.	Plain Dividers, 6 inches long, each,	2.50
148.	Hair Spring Dividers, 4½ inches long, each,	2.25
149.	Hair Spring Dividers, 5 to 6 inches long, each,	2.50
150.	Dividers, 6½ inches long, with Pen, Pencil, Needle Points, and Lengthening Bar,	6.50
151.	Dividers, 6½ inches long, with fixed Needle Point and Loose Pen, and Pen Points and Lengthening Bar,	6.00
152.	Dividers, 6½ inches long, joints in each leg, with Pen, Pencil, Needle Points, Dotting Pen, and Lengthening Bar,	9.00



153.

154.

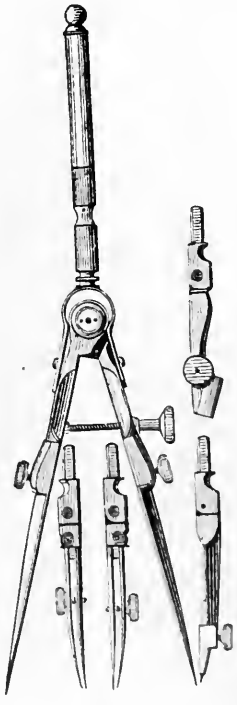
154½.

No.		Price.
153.	Dividers, 4 inches long, with Pen, Pencil, and Needle Points,	$5.00
154.	Dividers, 4 inches long, with fixed Needle Point, and Pen and Pencil Points, changeable,	4.50
154½.	Fox's Patent Lead Holder for pencil leg of Dividers,	.25

155.

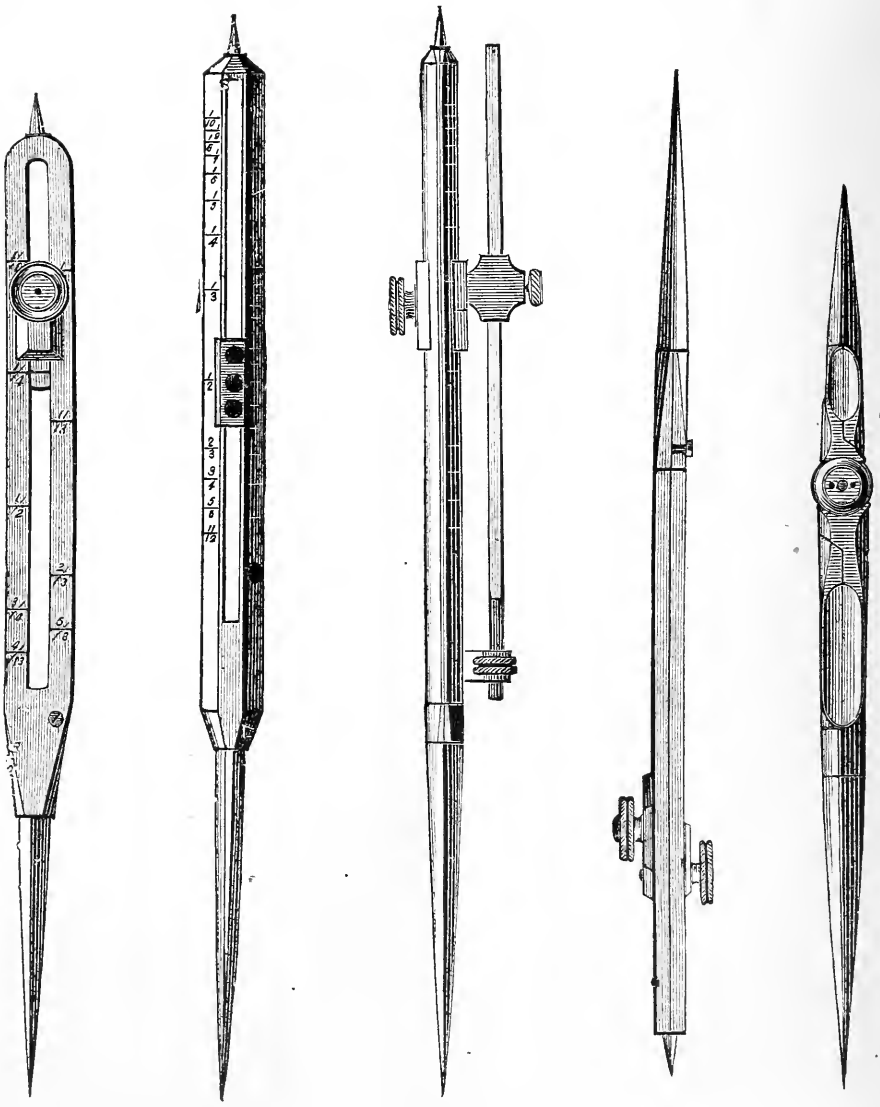
156.

157.



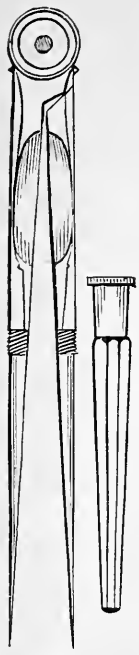
158.

155.	Dividers, 4 inches long, with two fixed Needle Points,	3.00
156.	Dividers, 4 inches long, with fixed Needle Point and Pen Point,	3.00
157.	Dividers, 4 inches long, with fixed Needle Point and Pencil Point,	3.00
158.	Dividers, 4 inches long, with Spring and Set Screw, Needle Point, Pencil Point, and two Pen Points,	7.00

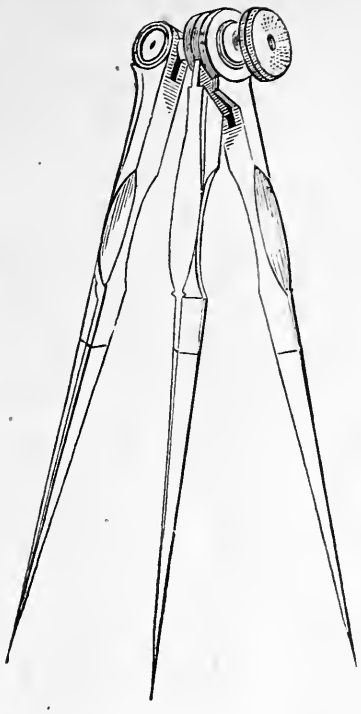


159. 161. 162. 163. 164.

No.		Price.
159.	Proportional Dividers, 6½ inches long, finely graduated for lines,	$8.00
160.	Proportional Dividers, 6½ inches long, finely graduated for lines and polygons,	9.00
161.	Proportional Dividers, 9 inches long, finely graduated for lines and polygons,	10.00
162.	Proportional Dividers, 9 inches long, with micrometer adjustment, finely graduated for lines and polygons,	12.00
163.	Proportional Dividers, 8 inches long, with rack adjustment, graduated for lines,	10.50
164.	Bisecting Dividers, 7½ inches long, each,	4.25

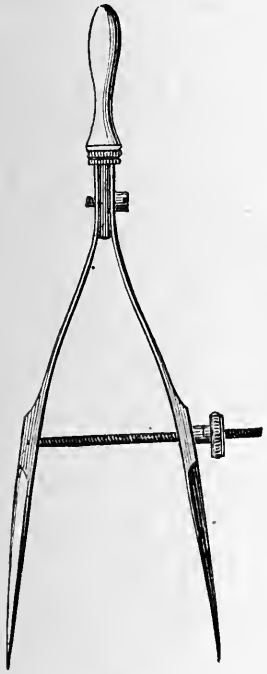


165.



166.

No.		Price.
165.	Pocket Dividers, 5 to 6 inches long, with Sheath, each,	$2.40
166.	Three-legged Dividers, 5 to 6 inches long, each,	4.25



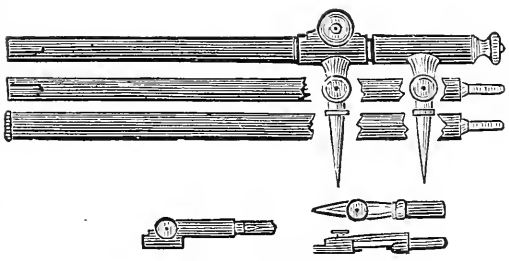
167.

168.

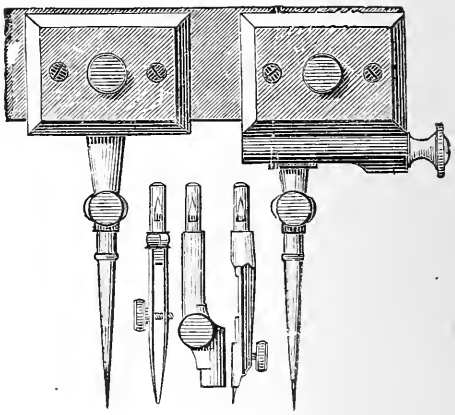
168½.

169.

167.	Steel-spacing Dividers, 5 inches long, with Ivory Handle,	2.50
168.	Steel-spacing Dividers, 3½ inches long, with Ivory or Metal Handle,	1.50
168½.	Very delicate Steel-spacing Dividers, 2½ inches long,	1.70
169.	Steel-spacing Dividers, 3½ inches long, with Ivory Handle and Needle Points,	2.50



171.



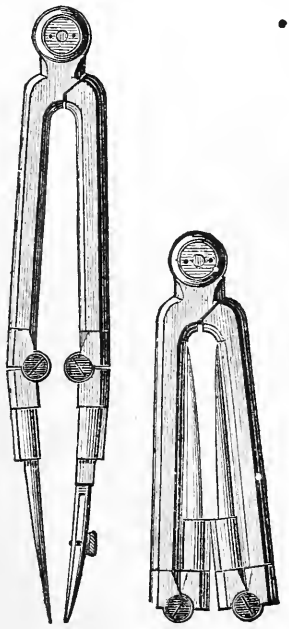
174.

No.		Price.
170.	Beam Compass, 20 inches long, in 2 bars, with Pen, Pencil, and two Straight Points,	$9.25
171.	Beam Compass, 21 inches long, in 3 bars,	10.50
172.	Do. do. 36 do. 4 do.	15.00
173.	Do. do. 54 do. 4 do.	21.00
174.	Furniture for Wood Bar Beam Compasses, in morocco box,	7.00

174½.

174½. Hardwood Bars for Beam Compasses,

	24	30	36	42	48	60	inch.
each,	.75	.85	$1.00	1.25	1.35	1.50	



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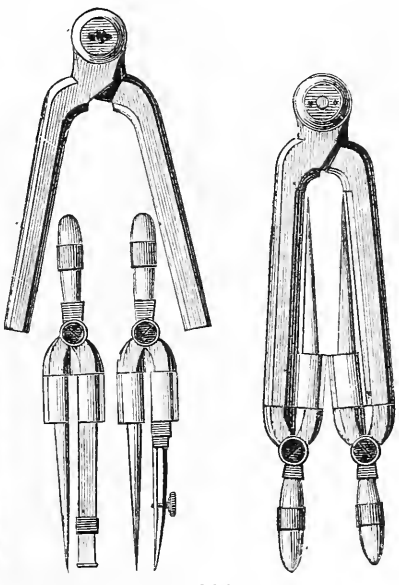
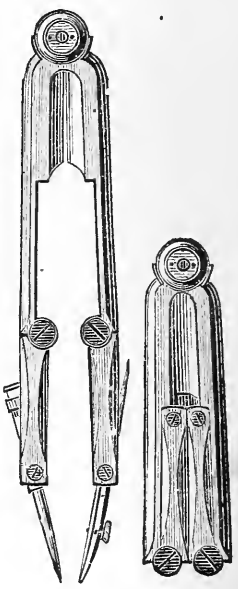


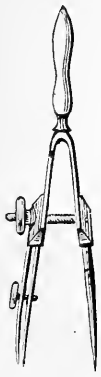
180.



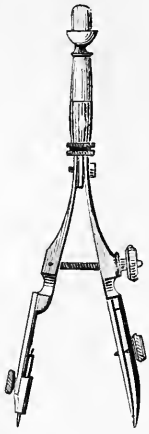
181.

No.		Price.
175.	Furniture for Wood Bar Beam Compasses, not in morocco box,	$6.75
179.	Pillar Compasses, or Pocket Set of Instruments, with Points to change,	7.50
180.	Pillar Compasses, or Pocket Set of Instruments, with Points to change, and Handles to Bow Pen and Pencil,	8.00
181.	Pillar Compasses, or Pocket Set of Instruments, with Points to turn,	7.50

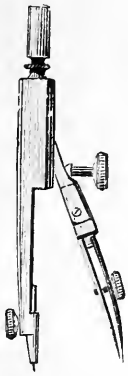
182.



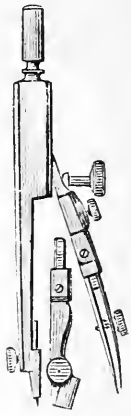
182½.



183.

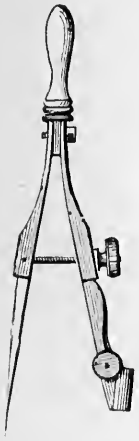


184.



185.

					Price.
182.	Spring Bow Pen, all steel, Ivory Handle,				2.00
182½.	Very delicate Steel Bow Pen, 2½ inches long,				2.25
183.	Spring Bow Pen, with Needle Point, all steel, Ivory Handle,				2.40
184.	Do.	do.	German Silver,		2.00
185.	Do.	do.	do.	with Pencil Point,	3.00



186.

186½.

187.

188.

189.

190.

					Price.
186.	All Steel Spring Bow Pencil, Ivory Handle,				2.00
186½.	Very delicate Steel Bow Pencil, 2½ inches long,				2 25
187.	All Steel Spring Bow Pencil, Ivory Handle, Needle Point,				2.40
188.	Drawing Pen, 4½ inches long, with joints,				1.25
189.	Do.	5½	do.	do.	1.40
190.	Do.	6½	do.	do.	1 60

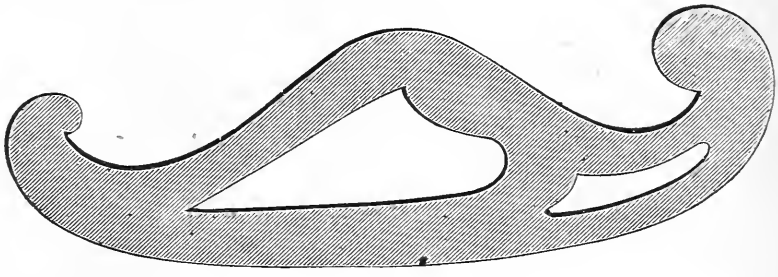


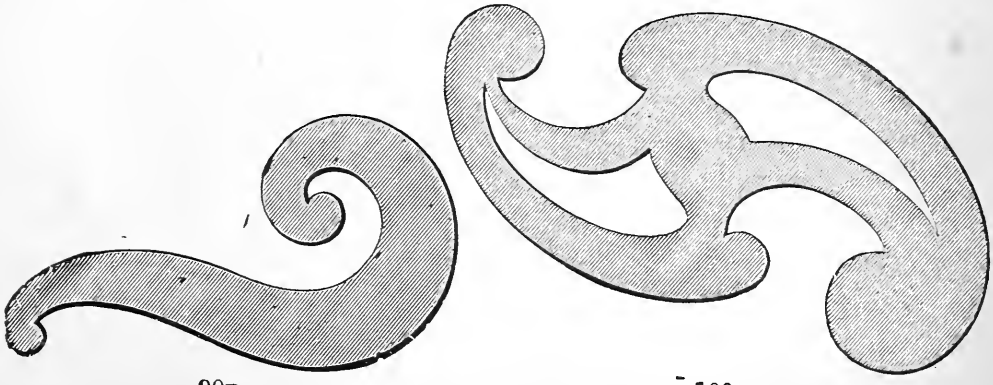


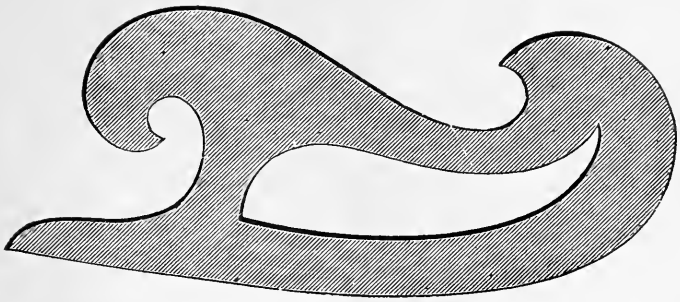
195.

191. 192. 193. 194½. 196. 197.

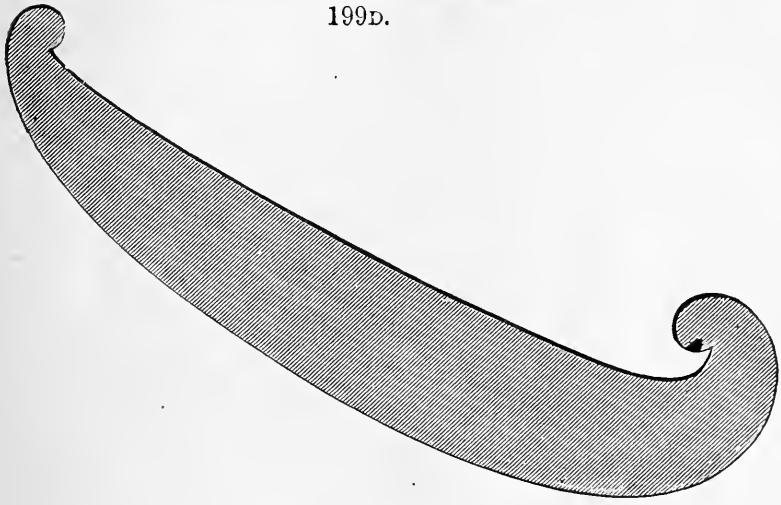
No.		Price.
191.	Road, or Double Drawing Pen,	$3.75
192.	Do. do. do. with joint in each side,	3.00
193.	Dotting Pen, with one wheel,	2.00
194.	Do. with six wheels,	3.50
194½.	Do. with three wheels,	3.75
195	Horn Centre, with German Silver edges,	.40
196.	German Silver Centre, with handle,	.60
197.	Do. Fastening Tacks, per dozen,	.60
198.	Steel Fastening Tacks. per dozen,	.60


199A.

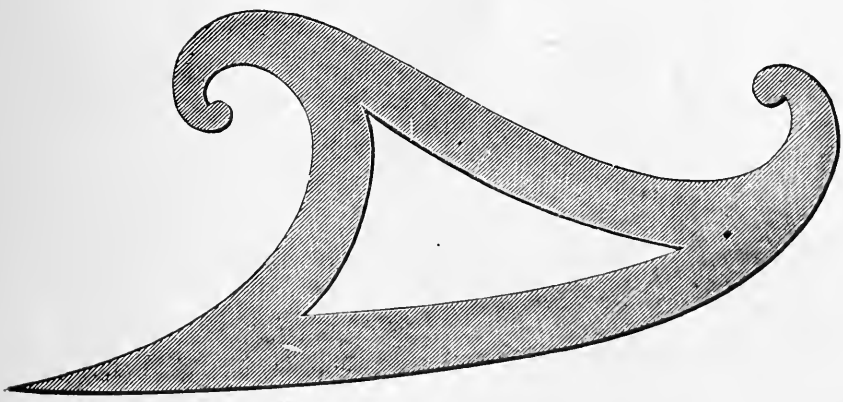

99B. 199C.



199D.



199E.



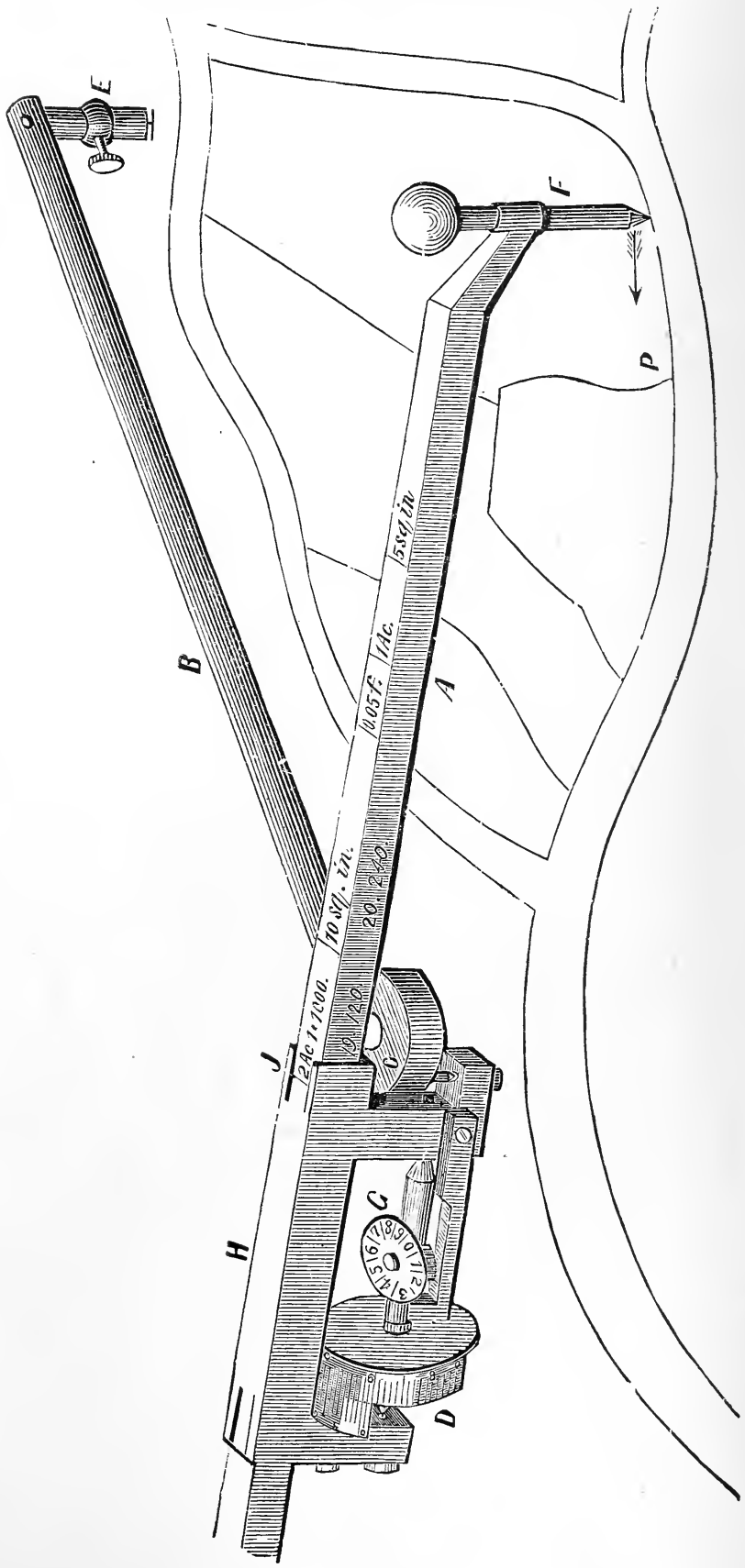
199F.

No.		Price.
199.	Irregular Curves of Horn, each,	$0.75
200½	Polar Planimeter,	30.00
203.	Steel Needle Points for Divider legs, each,	.15

☞ *For Boxwood and Ivory Scales, Protractors, etc., etc., see pages 38 to 42.*

Parties wanting cases made up of these instruments can select the pieces by the above list that are best adapted to their purpose, and we will have boxes made to suit, at an additional cost of from $7 to $15, according to the sizes of the boxes, which are made of rosewood, mahogany or walnut, highly finished.

AMSLER'S POLAR PLANIMETER.



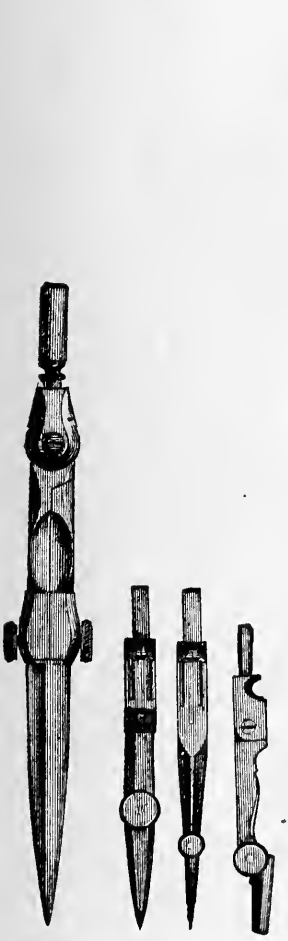
No. 200½

GERMAN-SILVER INSTRUMENTS.

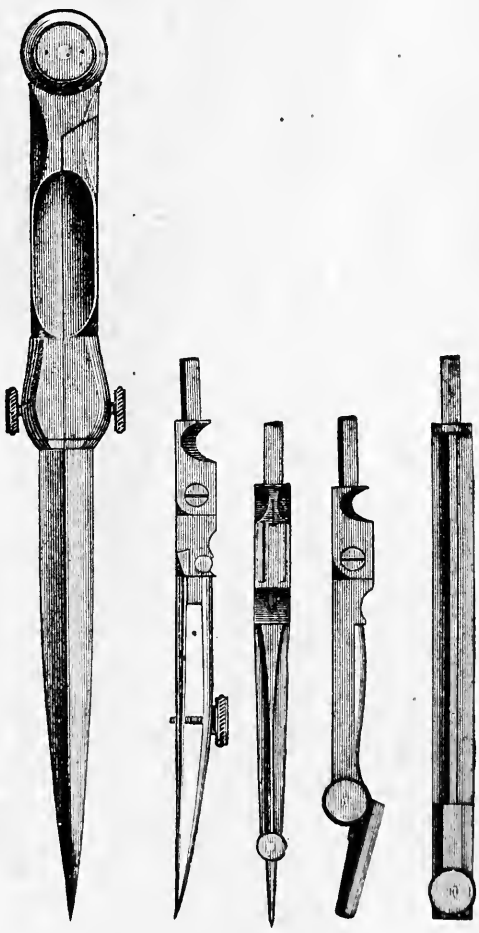
FOR ENGINEERS, ARCHITECTS, AND MECHANICAL DRAUGHTSMEN.

VERY BEST MAKE.

Best German-Silver and English Steel.

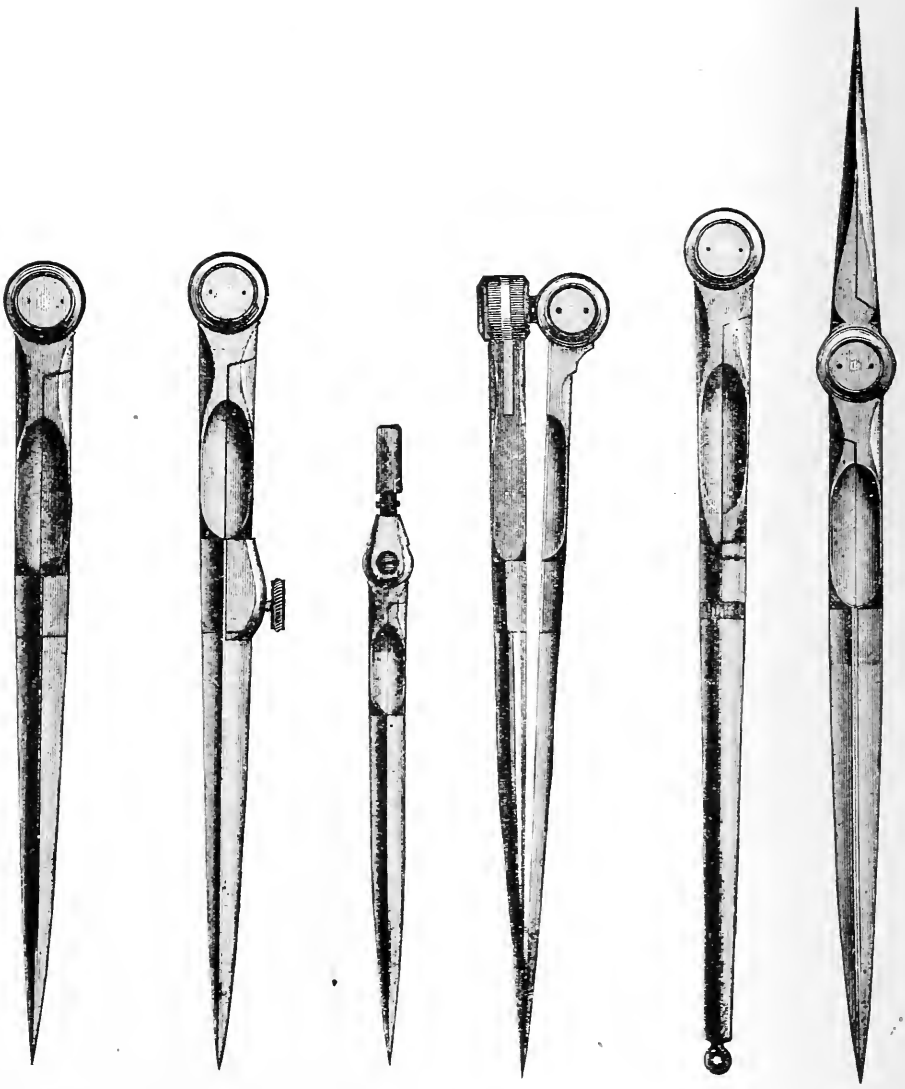


A 200.



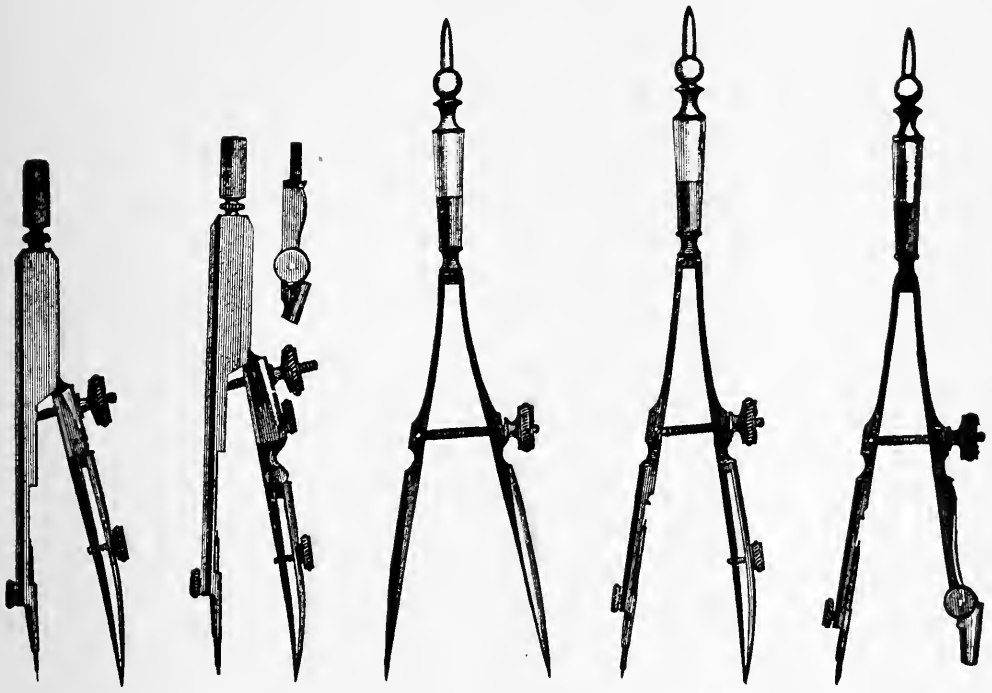
A 201.

No.		Price.
A 200.	Dividers 3½ inches long; steel joints, with Pen, Pencil, and Needle Point,	$2.75
A 201.	Dividers, 6 inches long; steel joints, with Pen, Pencil, Needle Point, and Lengthening Bar,	3.75



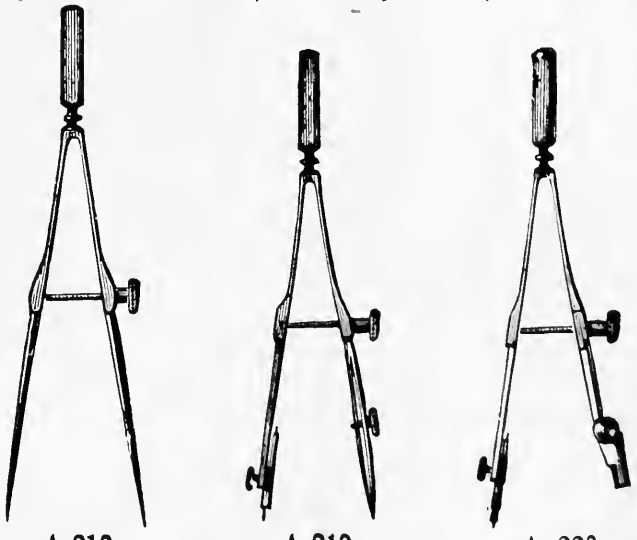
A 202.–A 204. A 205.–A 207. A 208. A 210. A 209. A 211.

No.		Price.
A 202.	Dividers, 4 inches long, steel joints,	$0.70
A 203.	Do. 5 do. do.	.85
A 204.	Do. 6 do. do.	1.00
A 205.	Dividers, with hair spring, 4 inches long, steel joints,	1.25
A 206.	Do. do. 5 do. do.	1.75
A 207.	Do. do. 6 do. do.	2.00
A 208.	Dividers, plain, 3 inches long, with handle,	1.00
A 209.	Pocket Dividers, with sheath,	1.75
A 210	Triangular Dividers,	3.75
A 211.	Bisecting or Whole and Half Dividers, $6\frac{1}{2}$ inches,	2.75



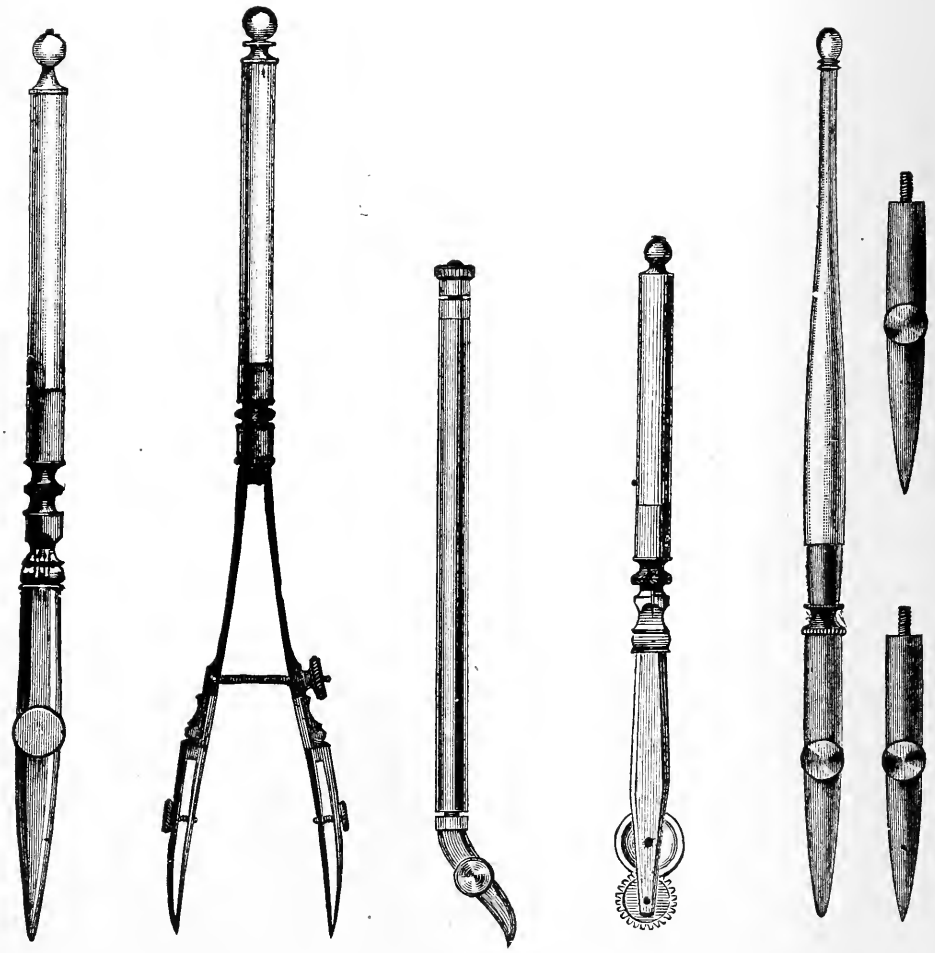
A 212. A 213. A 214. A 215. A 216.

No.		Price.
A 212.	German silver Bow Pen, with spring, adjusting screw, and Needle Point,	$1.75
A 213.	German silver Bow, Needle Point, with spring, adjusting screw, and Pencil Point,	2.50
A 214.	Steel Spacing Divider, ivory handle, 3½ inch,	1.25
A 215.	Steel Bow Pen, 3½-inch Needle Point, with ivory handle,	1.60
A 216.	Steel Bow Pencil, 3½-inch Needle Point, with ivory handle,	1.60



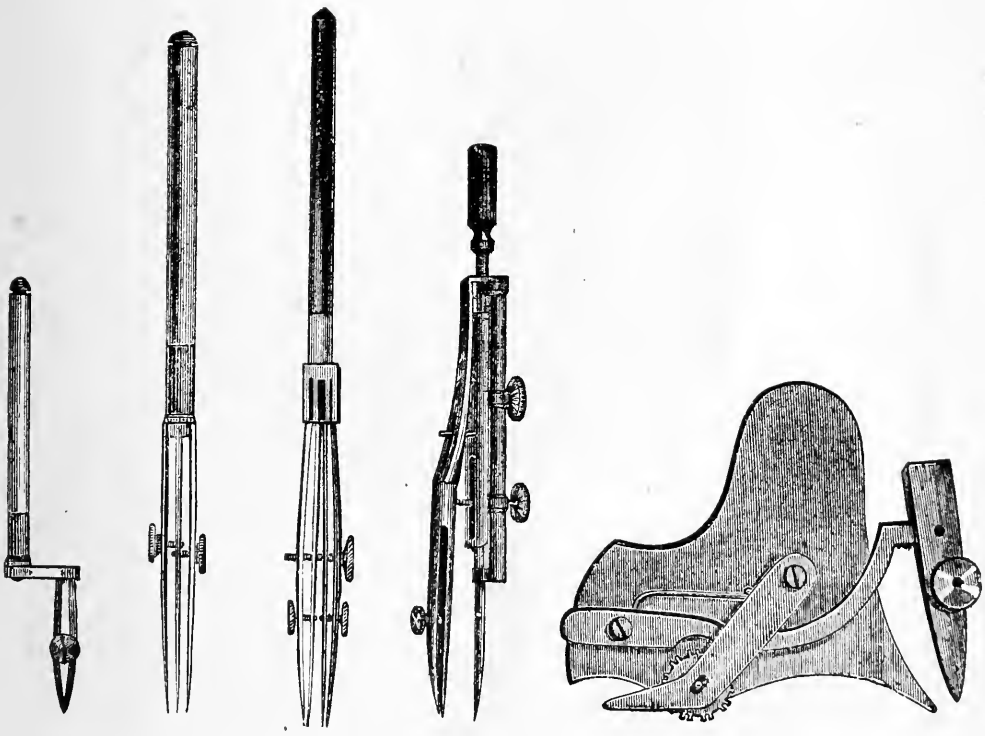
A 217. A 218. A 219. A. 220.

A 217.	Set of 3 Bows, A 214, A 215, and A 216, in Morocco pocket case,	4.95
A 218.	Steel Spacing Dividers, with German silver handle,	1.25
A 219.	Steel Bow Pen, with Needle Point, German silver handle,	1.70
A 220.	Steel Bow Pencil, with Needle Point, German silver handle,	1.70



A 225-227. A 228. A 229. A 230. A 234.

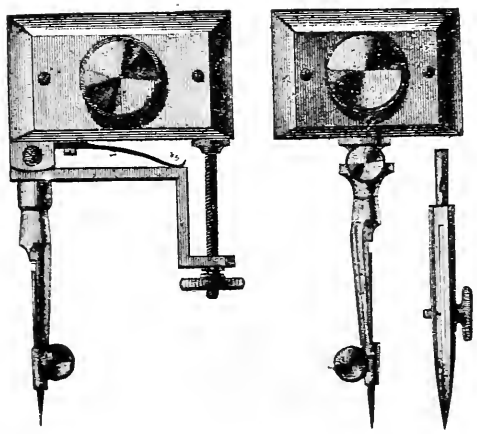
No.		Price.
A 225.	Drawing Pen, fine joint and pin, 4½ inch,	$0.85
A 226.	Do. do. 5½ do.	95
A 227.	Do. do. 6 do.	1.00
A 228.	Railroad Pen, 5½ inch,	2.70
A 229.	Curve Pen,	2.00
A 230.	Dotting Pen, one wheel, 5½ inch,	1.00
A 231.	Drawing Pen, with joint, with German silver blades for red ink, 5 inch,	90
A 232.	Drawing Pen, with joint and pin, with German silver blades for red ink, 5 inch,	1.15
A 233.	Hatching Pen, 5½ inches, with 2 pens to one handle,	1.00
A 234.	Do. do. 3 do.	1.25
A 235.	Do. do. 5 do.	1.75



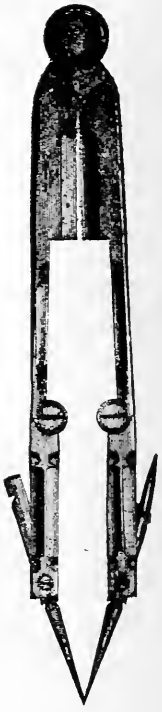
A 237. A 238. A 239. A 240. A 241.

No.		Price.
A 237.	Drawing Pen for Curves,	$1.50
A 238.	Drawing Pen for Heavy Border Lines,	2.50
A 239.	Patent Double Drawing Pen. Will draw with one stroke one broad or two parallel lines,	3.75
A 240.	Improved Bow Pen. The needle point in this pen being adjustable, it will draw extremely minute circles,	3.00
A 241.	Dotting Instrument, with 3 extra wheels,	3.75

This instrument answers the purpose of making dotted lines better than any yet made. It consists of a small, conveniently shaped German silver plate, upon which is fastened a pen connected by a small bar, and a ratchet movement with a rolling wheel. The bar is kept in its place by a small spring. Extra wheels of different patterns accompany the instrument, which, being readily changed, allow the making of various forms of lines.



A 242.

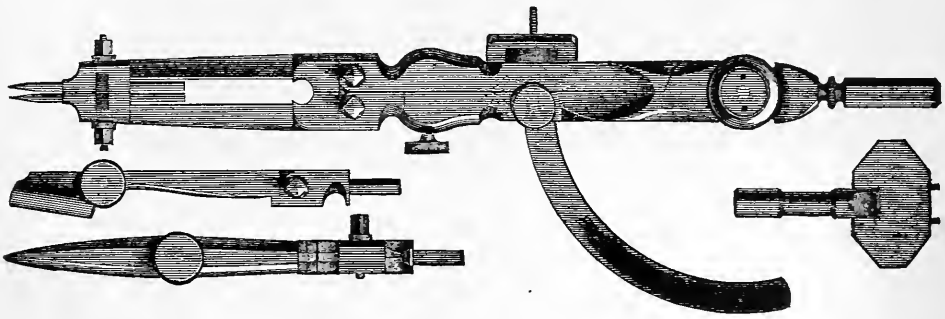


A 246.

No.		Price.
A 242.	Beam Compasses to fit on straight edge, with 2 Points, Pencil, and Needle Point,	$9.00
A 243.	Do. do. with wheel attachment to stand alone,	11.00
A 244.	Beam Compasses, McCord's pattern, with two Points, Pen, Pencil, and Needle Point,	14.00
A 245.	Do. do. with wheel attachment to stand alone,	16.50
A 246.	Pocket Compass with handles and folding points,	5.00

A 247.

A 247.	Proportional Dividers, 6½-inch, finely divided for lines and circles,	7.00



A 248.

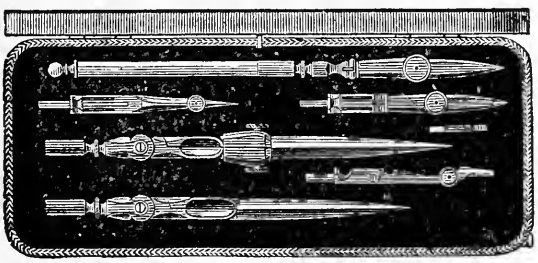
A 248.	Lithographic Dividers, heavy, with arc set-screw, and micrometer adjustment 8-inch, with Pen, Pencil Point, Lengthening Bar, and Wrench Key,	13.00

GERMAN SILVER INSTRUMENTS.

FOR ENGINEERS, ARCHITECTS, AND MECHANICAL DRAUGHTSMEN.

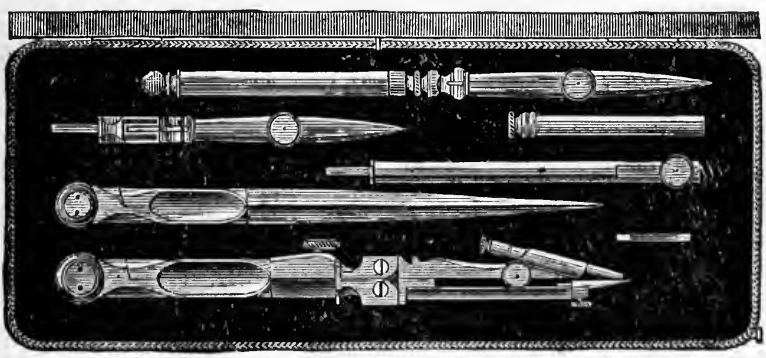
VERY BEST MAKE.

In Fine Velvet-Lined Morocco Pocket Cases.



No. A 250.

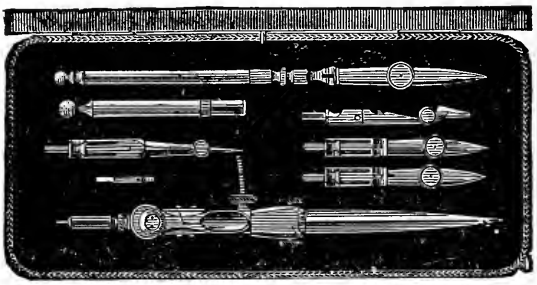
A 250. Morocco case, containing
1 pair 3½ in. Dividers, with Pen, Pencil, Needle Point, and Lengthening Bar, No. A 207.
1 pair 3½ in. Plain Dividers.
1 Drawing Pen, joint and pin, 4½ in. No. A 225.
1 Box Leads. $5 00



No. A 251.

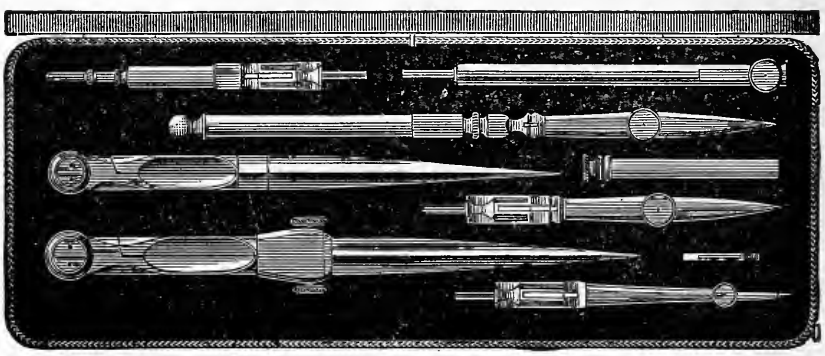
A 251. Morocco case, containing
1 pair 5 in. Dividers, with fixed Needle Point, Pen and Pencil Points, and Lengthening Bar.
1 pair 5 in. Plain Dividers, No. A 201.
1 Drawing Pen, joint and pin, 5½ in., No. A 226.
1 Box Leads, ... 4 50

A 252. Same as above with addition of Nos. A 214, A 215, and A 216 . . 9 00



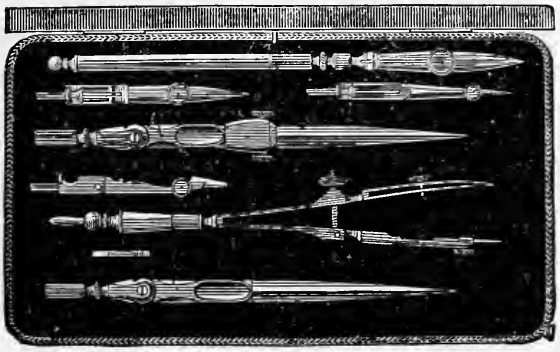
No. A 253.

A 253. Morocco case, containing
1 pair 3½ in. Spring Dividers, with Ivory Handle, with 2 Pens, Pencil, and Needle Point.
1 Drawing Pen, with joint and pin, A 225.
1 Box Leads, ... $6 00



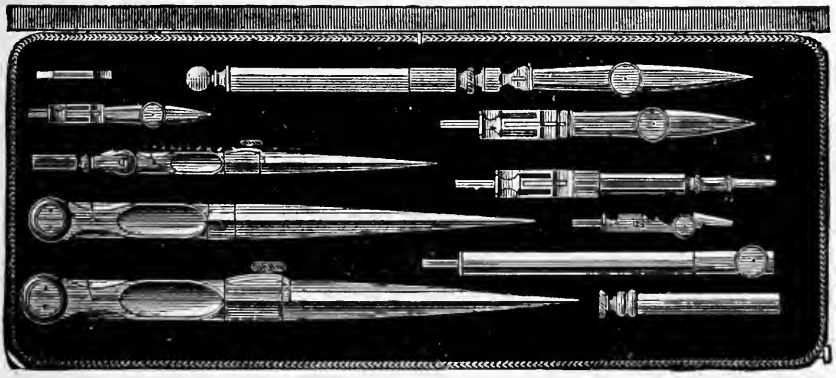
No. A 254.

A 254. Morocco case, containing
1 pair 6 in. Dividers, with Pen, Pencil, Needle Point, and Lengthening Bar, No. A 208.
1 pair Plain Dividers, 5 in. No. A 201.
1 Drawing Pen, with joint and pin, No. A 226.
1 Box Leads, ... 6 00



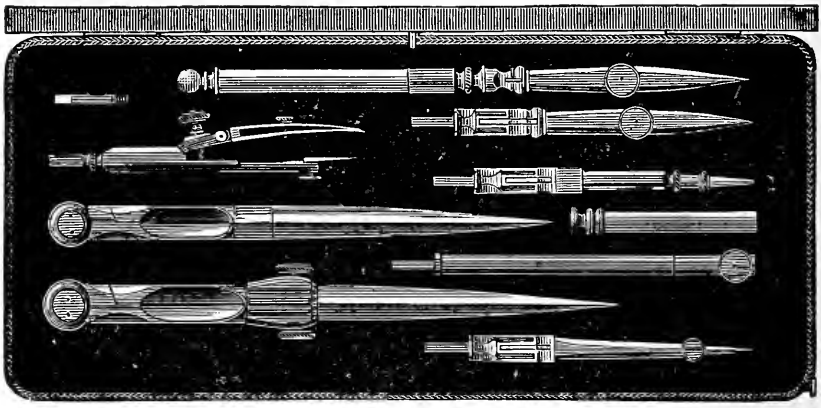
No. A 255.

A 255. Morocco case, containing
1 pair 3½ in. Dividers, with Pen, Pencil, Needle Point, and Lengthening Bar, No. A 207.
1 pair 3½ in. Plain Dividers.
1 Spring Bow Pen, with Needle Point, A 215.
1 Drawing Pen, with joint and pin, 4½ in. No. A 225.
1 Box Leads, ... $8 00



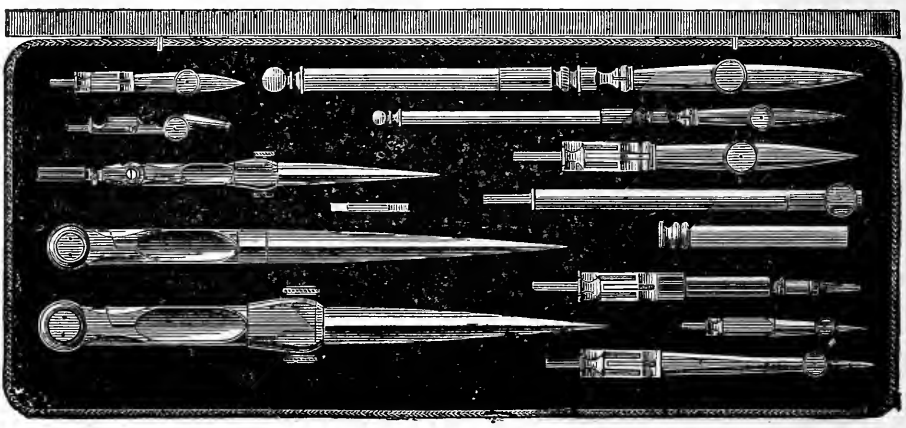
No. A 256.

A 256. Morocco case, containing
1 pair 5½ in. Dividers, with Pen and Pencil Points and Lengthening Bar.
1 pair 5 in. Plain Dividers, No. A 201.
1 pair 3½ in. Dividers, with Pen and Pencil Points.
1 Drawing Pen, joint and pin, No. A 226.
1 German Silver Protractor.
1 German Silver Square, ... 7 50



No. A 257.

A 257. Morocco case, containing
1 pair 5½ in. Dividers, with Pen, Pencil, Needle Point, and Lengthening Bar, No. A 208.
1 pair 5 in. Plain Dividers, A 201.
1 Spring Bow Pen, A 220.
1 Drawing Pen, joint and pin, A 226.
1 Box Leads, ... $7 50



No. A 258.

A 258. Morocco case, containing
1 pair 5½ in. Dividers, with Pen and Pencil, Needle Point and Lengthening Bar, No. A 208.
1 pair Plain Dividers, 5 in., No. A 201.
1 pair 3½ in. Dividers, with Pen, Pencil, and Needle Point.
1 Drawing Pen, joint and pin, 4½ in. No. A 225.
1 " " " " 5½ in. No. A 226.
1 German Silver Protractor.
1 German Silver Square.
1 Box Leads, ... 10 50

PERFECT PIVOT JOINT INSTRUMENTS.

These instruments, of the best German Silver and English Steel, with Adjustable Pivot Joint, insuring smooth and regular motion of the legs, are of the highest quality, and are most accurately made. We can recommend them for general excellency of finish, and for the care with which the pens are made and pointed.

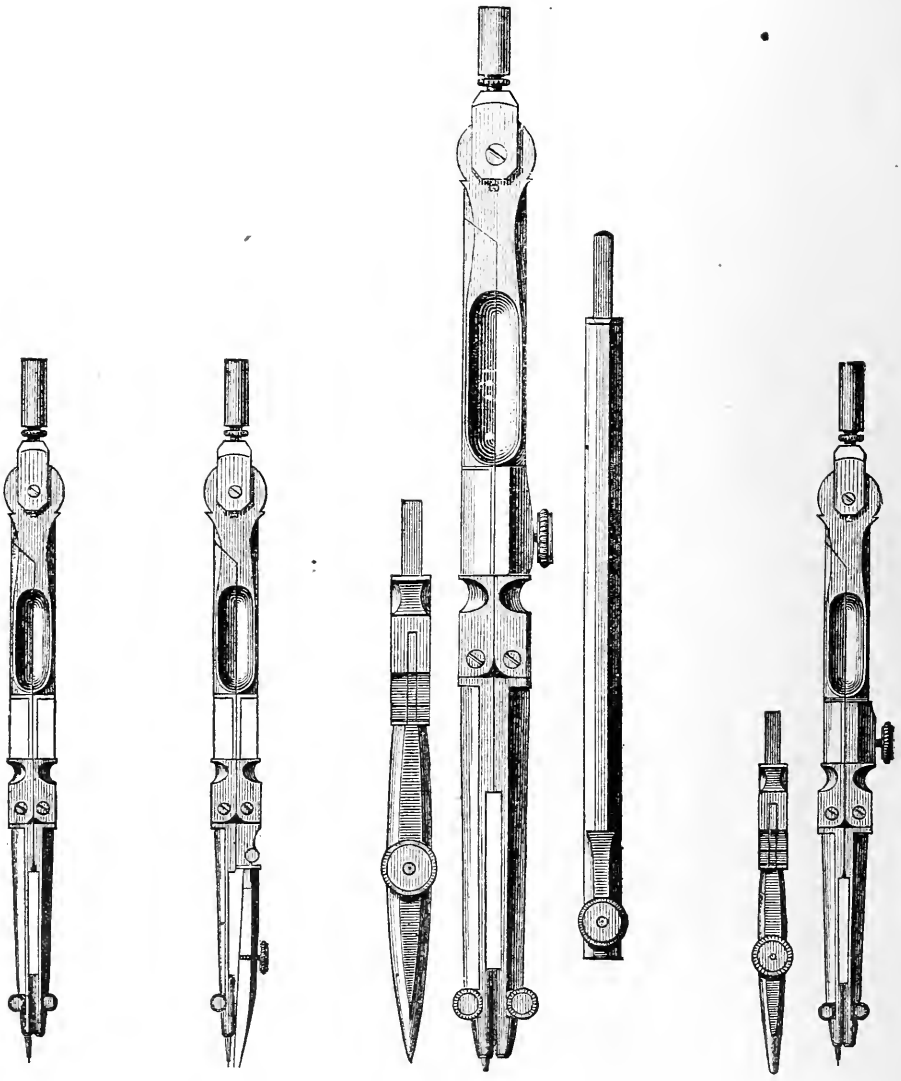
No. A 276.

No. A 278.

No. A 279.

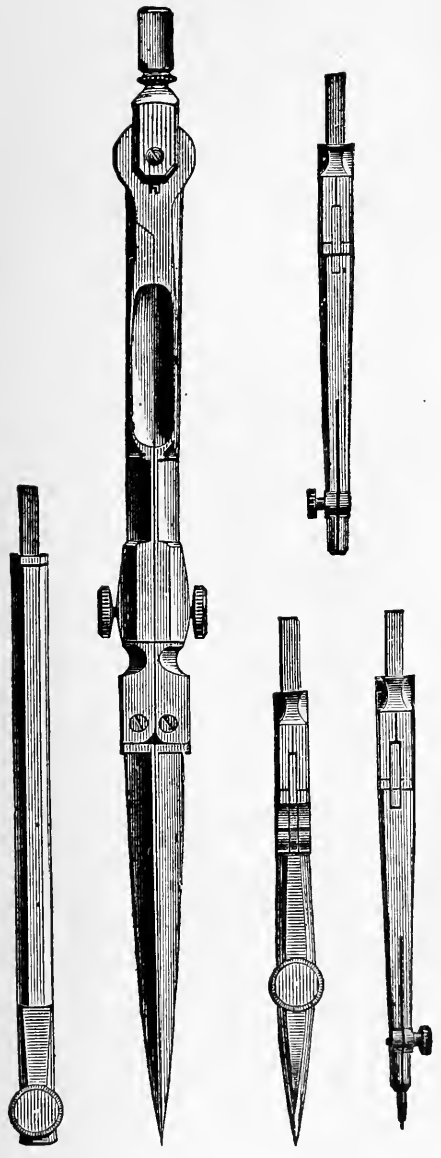
No. A 281.

A 276.	Plain Dividers, 3½ in. long, each,	$1 50
A 277.	Plain Dividers, 5 in. long, each,	1 75
A 278.	Plain Dividers, 6 in. long, each,	2 25
A 279.	Hair Spring Dividers, 3½ in. long, each,	2 25
A 280.	Hair Spring Dividers, 5 in. long, each,	2 75
A 281.	Hair Spring Dividers, 6 in. long, each,	3 25

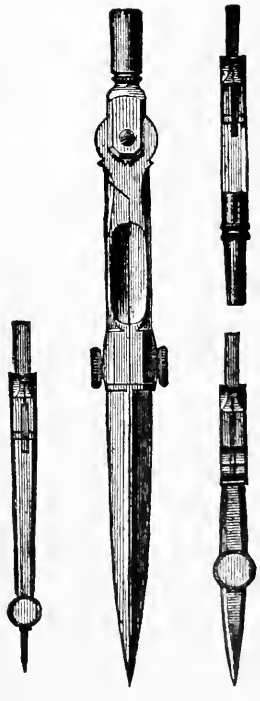


No. A 282. No. A 283. No. A 284. No. A 284½.

A 282.	Needle Point Dividers, 3½ in. long, with Pencil Point, each, . . .	$3 50
A 283.	Needle Point Dividers, 3½ in. long, with Pen Point, each, ...	3 50
A 284.	Needle Point Dividers, 6 in. long, Pen and Pencil Point and Lengthening Bar, ...	5 50
A 284A.	Dividers, 6½ in. long, with Pen, Pencil, Needle Points, and Lengthening Bar, ...	6 50



No. A 284 B.

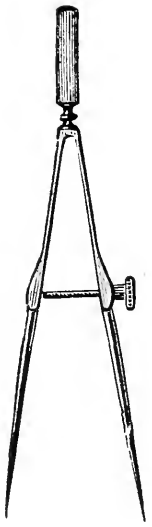


No. A 284 C.

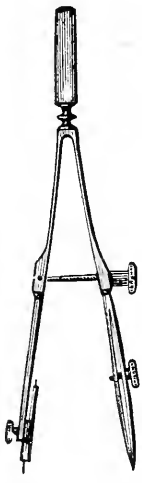
A 284B. Dividers, 6½ in. long, joint in each leg, with Pen, Pencil, Needle Points, and Lengthening Bar, ... $9 50

A 284C. Dividers, 3½ in. long, with Pen, Pencil, and Needle Point, . . . 5 50

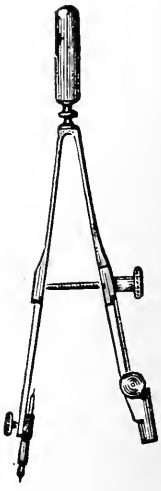
A 284½. Dividers, 3½ in. long, with fixed Needle Point, and Pen and Pencil Point, ... 5 00



No. A 285.

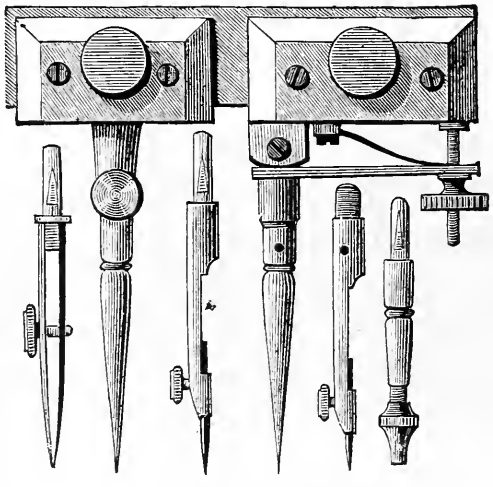


No. A 287.



No. A 289.

A 285.	Steel Spacing Dividers, 3 in. long,	$1 25
A 286.	Steel Bow Pen, 3 in. long, round point,	1 50
A 287.	Steel Bow Pen, 3 in. long, needle point,	1 75
A 288.	Steel Bow Pencil, 3 in. long, round point,	1 50
A 289.	Steel Bow Pencil, 3 in. long, needle point,	1 75
A 290.	Drawing Pen, 4½ in. long.	1 00
A 291.	" " 5½ " "	1 25
A 292.	" " 6 " "	1 50



No. A 293.

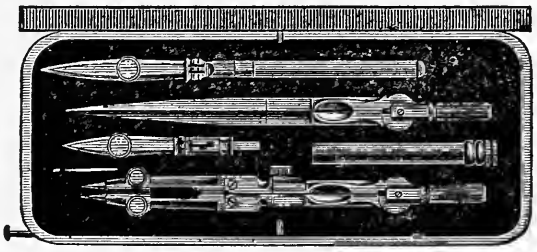
A 293.	Furniture for Straight-edge Beam Compasses, with Spring Adjustment, in morocco box,	7 00
A 294.	Mahogany Bar, 30 inches long, for do.,	75
A 295.	Boxwood Bar, 24 inches long, graduated,	50

PERFECT PIVOT JOINT INSTRUMENTS,

VERY BEST QUALITY

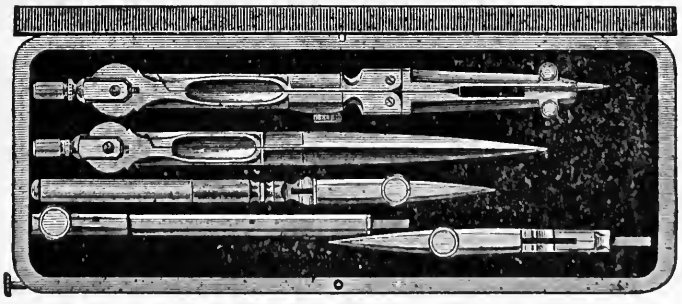
BEST GERMAN SILVER AND ENGLISH STEEL. ACCURATELY MADE AND CAREFULLY REFINISHED.

In Fine Velvet-Lined Morocco Pocket Cases.



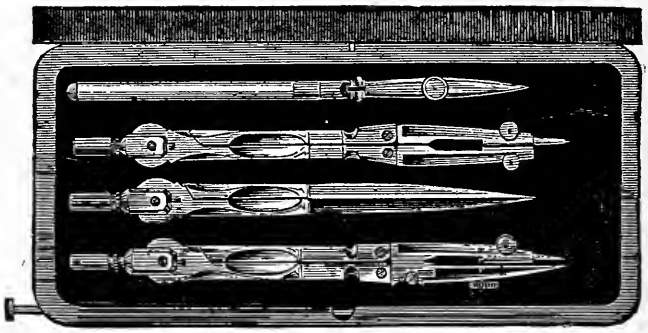
No. A 300.

A 300. Morocco case, containing
1 pair Perfect Joint Dividers, 3½ in. long, with fixed Needle Point, and Pen and Pencil Point, A 284½.
1 pair Plain Dividers, Perfect Joint, 3½ in., A 276.
1 Drawing Pen, 4½ in., A 290.
1 Box Leads, ... $8 00



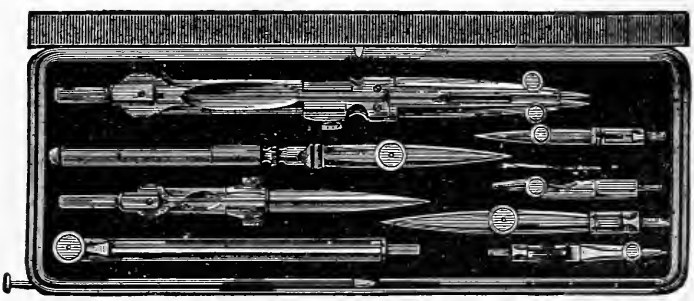
No. A 301.

A 301. Morocco case, containing
1 pair Perfect Joint Dividers, 6 in. long, with Pen, Pencil Point, and Lengthening Bar, A 284.
1 pair Perfect Joint Plain Dividers, 5 in. long, A 277.
1 Drawing Pen, 5½ in., A 291.
1 Box Leads, ... 9 50



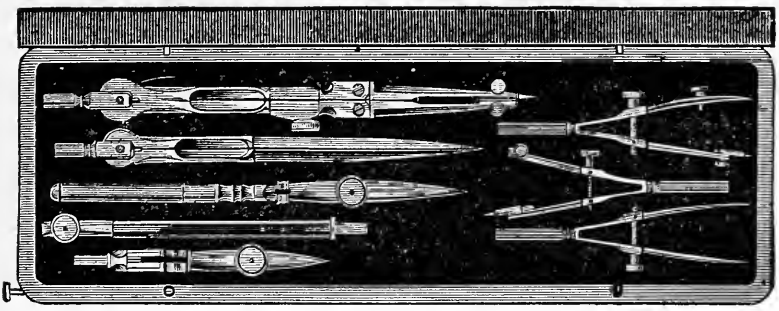
No. A 302.

A 302. Morocco case, containing
1 pair Perfect Joint Needle Point Dividers, 3½ in. long, with Pencil Point, A 282.
1 pair Perfect Joint Needle Point Dividers, 3½ in. long, with Pen Point, A 283.
1 pair Perfect Joint Plain Dividers, 3½ in., A 276.
1 Drawing Pen, A 290.
1 Box Leads, ... $10 50



No. A 303.

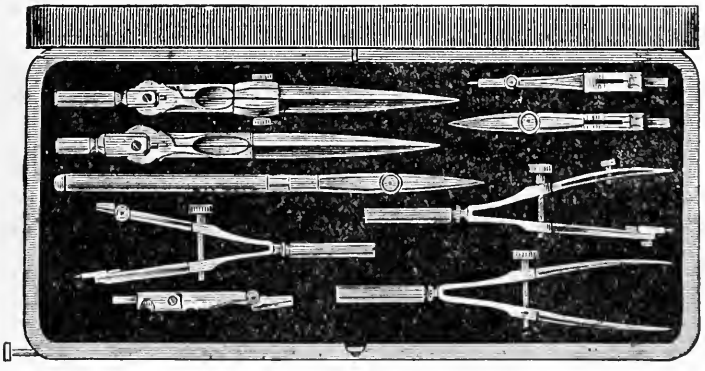
A 303. Morocco case, containing
1 pair Perfect Joint Dividers, 3½ in. long, with Pen, Pencil, and Needle Point, A 284 C.
1 pair Perfect Joint Dividers, 6 in. long, with Pen and Pencil Point and Lengthening Bar, A 284.
1 Drawing Pen, 5½ in., A 291.
1 Box Leads, ... 13 00



No. A 304.

A 304. Morocco case, containing

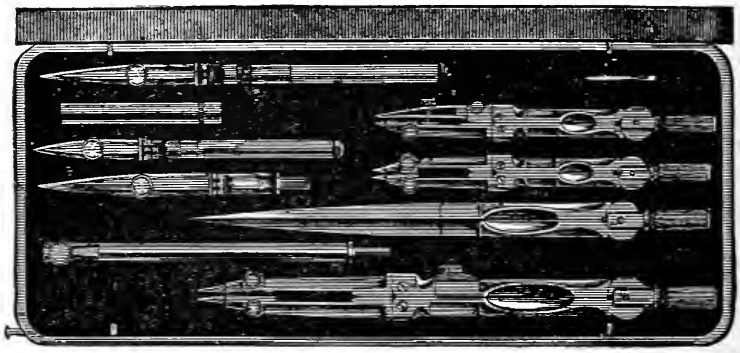
1 pair Perfect Joint Dividers, 3½ in. long, with fixed Needle Point, and Pen and Pencil Points, A 284½.
1 pair Perfect Joint Plain Dividers, 3½ in., A 276.
1 Steel Spacing Divider, A 285.
1 Steel Bow Pen, needle point, A 287.
1 Steel Bow Pencil, needle point, A 289.
1 Drawing Pen, 4½ in., A 290.
1 Box Leads, ... $12 50



No. A 305.

A 305. Morocco case, containing

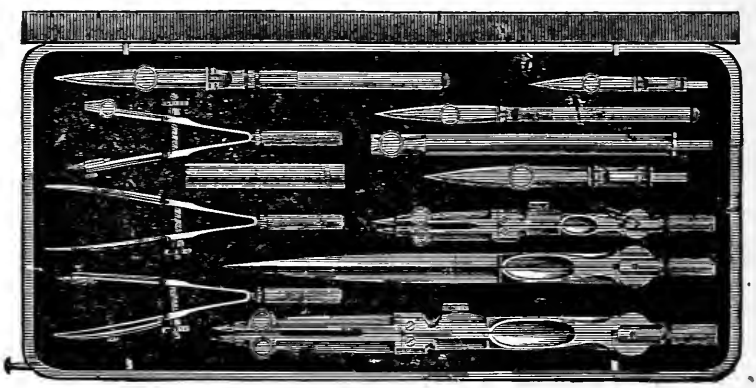
1 pair Perfect Joint Dividers, 3½ in. long, with Pen, Pencil, and Needle Points, A 284 C.
1 pair Perfect Joint Plain Dividers, 3½ in. long, A 276.
1 Steel Spacing Divider, A 285.
1 Steel Bow Pen, needle point, A 287.
1 Steel Bow Pencil, " " A 289.
1 Drawing Pen, 4½ in., A 290.
1 Box Leads, ... 13 50



No. A 306.

A 306. Morocco case, containing

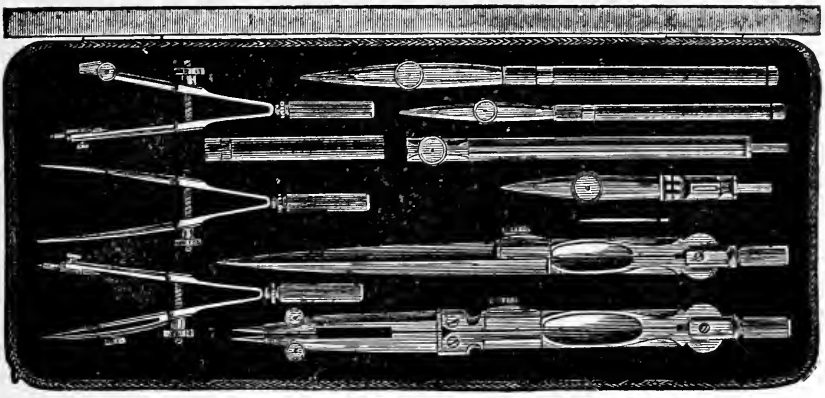
1 pair Perfect Joint Needle Point Dividers, 3½ in., with Pencil Point, A 282.
1 pair Perfect Joint Needle Point Dividers, 3½ in., with Pen Point, A 283.
1 pair Perfect Joint Dividers 6 in. long, with Pen and Pencil Point and Lengthening Bar, A 284.
1 pair Perfect Joint Plain Dividers, 5 in., A 277.
1 Drawing Pen, 4½ in., A 290.
1 " " 5½ in., A 291.
1 Box Leads, ... $18 00



No. A 307.

A 307. Morocco case, containing

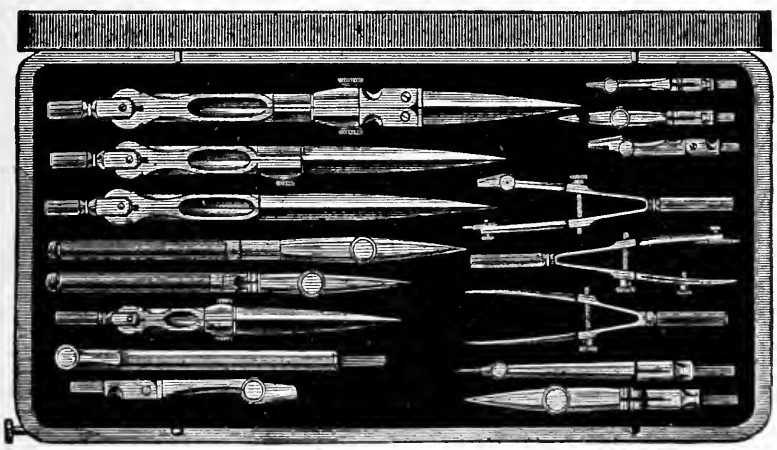
1 pair Perfect Joint Dividers, 6 in. long, and Pen and Pencil Points and Lengthening Bar, A 284.
1 pair Perfect Joint Dividers, 3½ in. long, with fixed Needle Point and Pen and Pencil Point, A 284½.
1 pair Perfect Joint Plain Dividers, 5 in. long, A 277.
1 Steel Spacing Dividers, 3 in., A. 285.
1 Steel Bow Pen, 3 in., A 287.
1 Steel Bow Pencil, 3 in., A 289.
1 Drawing Pen, 4½ in., A 290.
1 " " 5½ in , A 291.
1 Box Leads, ... 18 50



No. A 308.

A 308. Morocco case, containing

1 pair Perfect Joint Dividers, 6 in. long, with Pen and Pencil Point and Lengthening Bar, A 284.
1 pair Perfect Joint Hair Spring Dividers, 6 in. long, A 280.
1 Steel Spacing Divider, 3 in., A 285.
1 Steel Bow Pen, 3 in., needle point, A 287.
1 Steel Bow Pencil, 3 in., needle point, A 289.
1 Drawing Pen, 5½ in., A 291.
1 Box Leads, ... $14 50



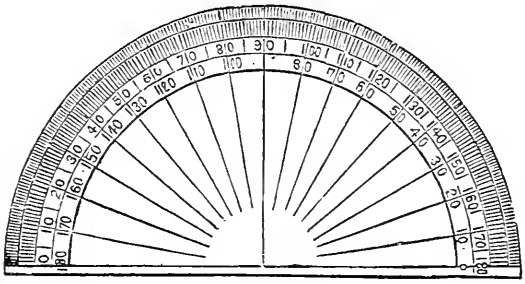
No. A 309.

A 309. Morocco case, containing

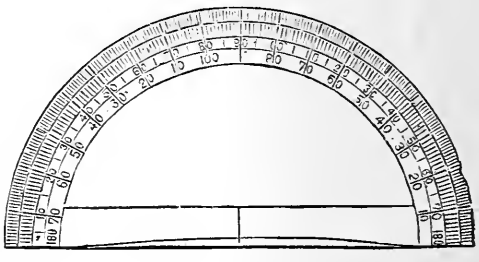
1 pair Perfect Joint Dividers, 3½ in. long, with Pen, Pencil, and Needle Point, A 284 C.
1 pair Perfect Joint Hair Spring Dividers, 6 in. long, A 280.
1 pair Perfect Joint Plain Dividers, 5 in. long, A 277.
1 Steel Spacing Divider, 3 in., A 285.
1 Steel Bow Pen, 3 in., needle point, A 287.
1 Steel Bow Pencil, 3 in., needle point, A 289.
1 Drawing Pen, 4½ in., A 290.
1 " " 5½ in., A 291.
1 Box Leads, ... 20 00

CHAPTER V.

PROTRACTORS OF HORN, BRASS, AND GERMAN SILVER.



301.



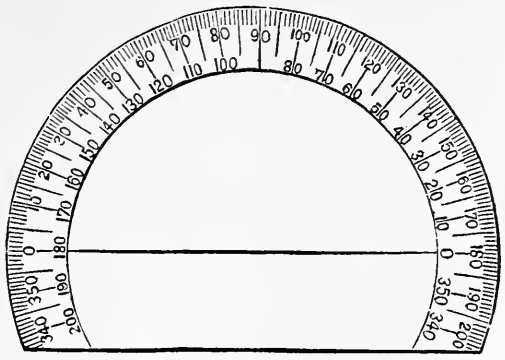
307.

No.		PRICE.
297.	Railroad Curve Protractor, of horn, 8 inches diameter, having laid off on it twenty-three curves from ½ degree to 8 degrees, with a radius of 400 feet to the inch,	$1.60
297½.	Horn Rectangular Protractor, 6 inches long, 2⅞ inches wide, divided around edge from 0 to 180 degrees, in -- degrees,	.50
298.	Horn Protractors, 5 inches diameter, whole circle, half degrees,	1.00
299.	Do. 6 do. do. do.	1.25
300.	Do. 7 do. do. do.	1.50
301.	Horn Protractor, 4 do. half circle, whole degrees,	.15
302.	Do. 5 do. do. half degrees,	.25
303.	Do. 6 do. do. do.	.30
304.	Do. 7 do. do. do.	.50
305.	Do 8 do. do. do.	.80
306.	Brass Protractor, 4 do. do. whole degrees,	.10
307.	Do. 4 do. do. half degrees,	.35
308.	Do. 5 do. do. do.	.55
309.	Do. 6 do. do. do.	.65
310.	German Silver Protractor, 4 inches diameter, half circle, whole degrees,	.50
311.	Do. do. 5 do. do. half degrees,	.85
312.	Do. do. 6 do. do. do.	1.00
313.	Do. do. 7 do. do. do.	1.15
314.	Do. do. 5 do. do. bev. edge, half deg.,	1.25
315.	Do. do. 6 do. do. do. do.	2.00
316.	Do. do. 7 do. do. do. do.	2.65

PAPER PROTRACTORS.

320.	Whole Circle Protractors, 8 or 13 inches diameter, half degrees, on drawing paper, printed in red or black, each,	.30
321.	Same as No. 320, on Bristol boards, each,	.40
322.	Same as No. 320, on vegetable tracing paper,	.25
323.	Half Circle Protractor, 5 inches diameter, half degrees, on Bristol boards, each,	25

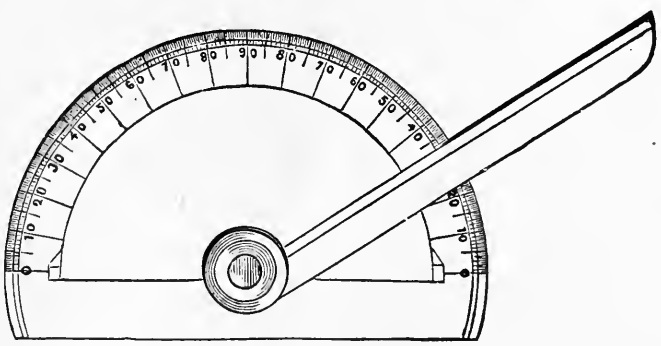
EXTRA FINE SWISS PROTRACTORS.



334.

No.									Price.
330.	Protractor, 4 inches diameter,			½	circle, whole degrees,		centre on outer edge,		$1.50
331.	Do.	5	do.	½	do.	½	do.	do.	2.00
332.	Do.	6	do.	½	do.	½	do.	do.	3.00
333.	Do.	6	do.	½	do.	¼	do.	do.	3.25
334.	Do.	5	do.	½	do.	½	do.	inner edge,	2.50
335.	Do.	6	do.	½	do.	½	do.	do.	3.00
336.	Do.	6	do.	½	do.	¼	do.	do.	4.00

EXTRA FINE SWISS PROTRACTORS, OF GERMAN SILVER, WITH ARMS.



350.

350. German Silver Protractor, 5 inches diameter, half circle, with arm, and divided in half degrees, ... 7.50

351. German Silver Protractor, 6 inches diameter, half circle, with arm, and divided in half degrees, ... 8.50

352. German Silver Protractor, 7 inches diameter, half circle, with arm, and divided in half degrees, ... 9.00

354. German Silver Protractor, 8 inches diameter, half circle, with arm, and divided in half degrees, ... 9.50

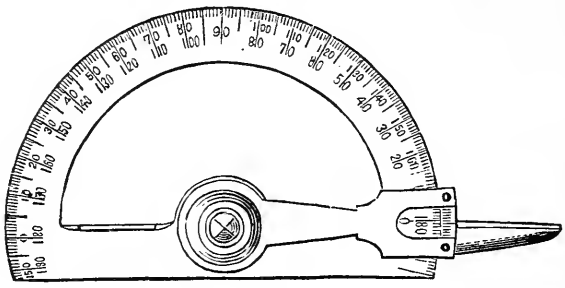
360. German Silver Protractor, 5 inches diameter, whole circle, with arm, and divided in half degrees, ... 9.00

361. German Silver Protractor, 6 inches diameter, whole circle, with arm, and divided in half degrees, ... 10.00

362. German Silver Protractor, 7 inches diameter, whole circle, with arm, and divided in half degrees, ... 11.00

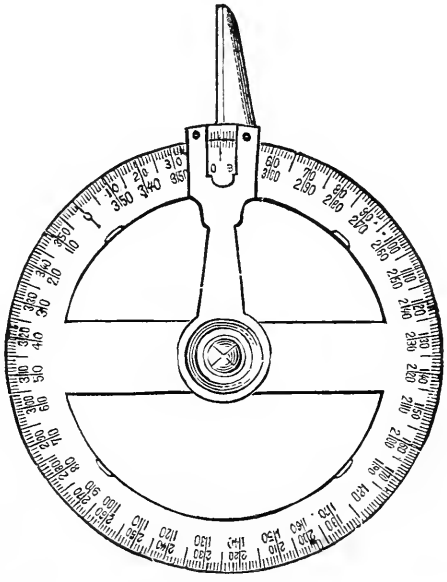
363. German Silver Protractor, 8 inches diameter, whole circle, with arm, and divided in half degrees, ... 12.00

EXTRA FINE SWISS PROTRACTORS OF GERMAN SILVER, WITH ARMS AND VERNIERS.



370.

No.		Price.
370.	Protractor, 5½ inches diameter, half circle, half degrees, with vernier reading to three minutes,	$11 00
371.	Protractor, 8 inches diameter, half circle, quarter degrees, with vernier reading to one minute,	14.00
372.	Protractor, 10 inches diameter, half circle, quarter degrees, with vernier reading to one minute,	18.00

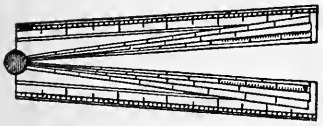


373.

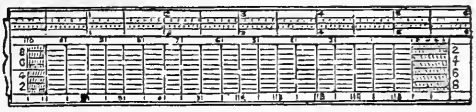
373.	Protractor, 5½ inches diameter, whole circle, half degrees, with vernier reading to three minutes,	14.50
374.	Protractor, 8 inches diameter, whole circle, quarter degrees, with vernier reading to one minute,	16.00
375.	Protractor, 10 inches diameter, whole circle, quarter degrees, with vernier reading to one minute,	20.00

CHAPTER VI.

SECTORS, SCALES, AND PROTRACTORS

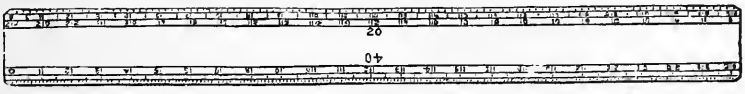


400.



401.

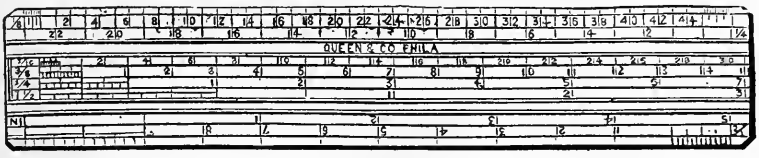
No.		PRICE.
400.	Ivory Sector, 6 inches long, opens to 12 inches long, ...	$2.25
401.	Ivory Scale, 6 inches long, for school drawing, ...	.75



402.

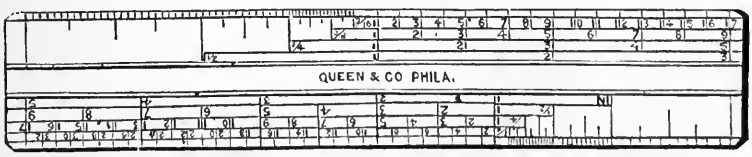
402.	Ivory Chain Scales, 12 inches long, graduated on two edges with either 10 and 10 parts, or 10 and 20, or 20 and 40, or 30 and 50, or 40 and 60, or 50 and 60, each, ...	3.00
403.	Do. do. do. with 40 and 80, or 50 and 100, each,	5.25
404.	Do. do. do. with 80 and 100, each, ...	5.75
405.	Ivory Off-set Scales, 2 inches long, 10 by 10, 10 by 20, 20 by 40, 30 by 50, 40 by 60, each, ...	.65

ARCHITECTS' IVORY SCALES.



406.

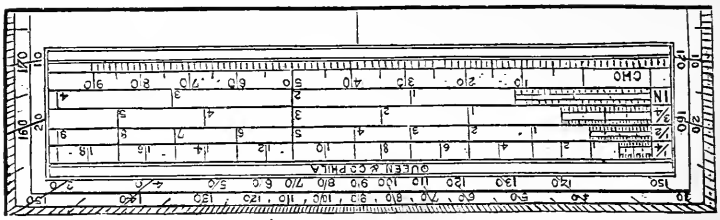
406.	Ivory Scale, 12 inches long, with 16 scales, as follows: $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{4}$. $2\frac{1}{2}$, and 3 inches to the foot, the first division of each scale subdivided in 12 parts, each, ...	3.00
407.	Same as No. 406, but with the first division of each scale subdivided into 10 parts, each, ...	3.00
408.	Ivory Scale, 12 inches long, with 12 scales, as follows: $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, and 3 inches to the foot, the first division of each scale subdivided into 12 parts, diagonal scale reading to $\frac{1}{100}$ and $\frac{1}{200}$ of an inch, each, ...	3.00
409.	Same as No. 408, but has the first division of each scale subdivided into 10 parts, each, ...	3.00



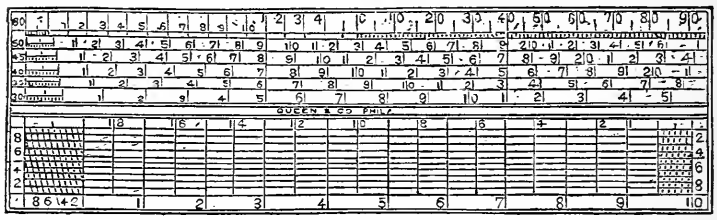
410.

410.	Ivory Scale, 12 inches long, one side rounded, the other flat, with the following scales, the graduations of which are all brought to the edge: $\frac{1}{16}$, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{2}$, and 3 inches to the foot, the first division of each scale is subdivided into 12 parts, each, .	3.00
411.	Same as No. 410, but the first division of each scale subdivided into 10 parts, each, ...	3.00
412.	Flat Ivory Scale, 6 inch, div. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 inch to the foot, each, . .	2.00
413.	Do. do. 12 do. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 do. do. . .	3.25
414.	Do. do. 12 do. $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 do. do. . .	3.25

IVORY PROTRACTORS.



425. FRONT SIDE.



425. REVERSE SIDE.

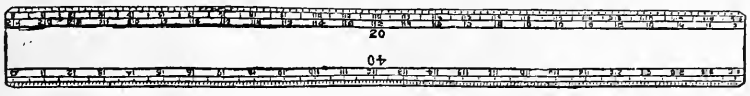
No.		Price
425.	Ivory Rectangular Protractor, 6 inches long, $1\frac{3}{4}$ inches wide, with scales as follows: front sides divided around edge from 0 to 180 degrees in single degrees, scales of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1 inch to the foot, and scale of chords. Reverse side scales of 30, 35, 40, 45, 50, and 60 parts to the inch, scale of chords and diagonal scale of inches and $\frac{1}{100}$ths, . .	$1.50
426.	Ivory Rectangular Protractor, 6 inches long by $1\frac{3}{4}$ inches wide, with scales as follows: front side, the edge divided in single degrees from 0 to 180 degrees, scales of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, and 1 inch to the foot, and scale of chords. On the reverse side, scales of 30, 35, 40, 45, 50, and 60 parts to the inch, scale of chords and diagonal scale of $\frac{1}{100}$ths, .	2.25
427.	Ivory Rectangular Protractor, 6 inches long by 2 inches wide, with scales as follows: front side, the edge divid ed in single degrees from 0 to 180 degrees, scales of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$ inches to the foot, scale of chords, and line of 40 parts on lower edge. On the reverse side scales of 20, 25, 30, 35, 40, 45, 50, 60 parts to the inch, diagonal scale of $\frac{1}{100}$ths,	3.25
428.	Ivory Rectangular Protractor, same as No. 427, but has the Protractor divided in $\frac{1}{2}$ degrees, ...	4.00
429.	Ivory Rectangular Protractor, 6 inches long by $2\frac{1}{4}$ inches wide, with scales as follows: front size, the edge divided in $\frac{1}{2}$ degrees from 0 to 180 degrees, scales of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$ inches to the foot, scale of chords, and scale of 40 parts on lower edge. Reverse side, scales of 10, 15, 20, 25, 30, 35, 40, 45, 50, 60 parts to the inch, and diagonal scale of $\frac{1}{100}$ths, ...	4.50
430.	Ivory Rectangular Protractor, 6 inches long by $2\frac{1}{2}$ inches wide, with scales as follows: front side, the edge divided in $\frac{1}{2}$ degrees from 0 to 180 degrees, scales of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$ inches to the foot, scale of chords, and scale of 40 parts on lower edge. Reverse side, scales of 20, 25, 30, 35, 40, 45, 50 and 60 parts to the inch, 2 scales of chords, scales of latitudes, sines, tangents, hours, longitudes, secants, rhombs,	6.00
431.	Ivory Rectangular Protractor, 8 inches long by 2 inches wide, with scales as follows: front side, the edge divided in $\frac{1}{2}$ degrees from 0 to 180 degrees, scales of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 inch to the foot, scale of chords and scale of 40 parts on lower edge. Reverse side, scales of 30, 35, 40, 45, 50, 60 parts to the inch, scale of chords and diagonal scale of $\frac{1}{100}$ths,	5.00
432.	Ivory Rectangular Protractor, 12 inches long by $2\frac{1}{2}$ inches wide, with scales as follows: the edge divided in $\frac{1}{2}$ degrees from 0 to 180 degrees, scales of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$, scale of chords and scale of 40 on lower edge. Reverse side, scales of 10, 15, 20, 25, 30, 35, 40, 45, 50, 60 parts to the inch, scale of chords and diagonal scale of $\frac{1}{100}$ths,	11.50

CHAPTER VII.

No. PRICE.

450. Boxwood Protractor, 6 inches long, $1\frac{3}{4}$ inches wide; whole degrees, with 6 scales of equal parts, 4 scales of feet and inches, 2 scales of chords, and diagonal scale, ... $0.50

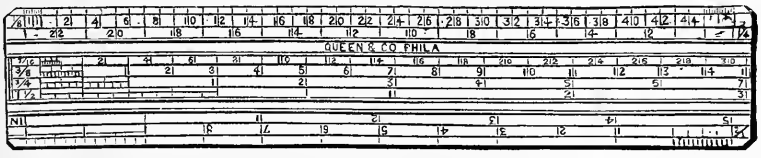
451. Boxwood Scale, 6 inches long, for School Cases of Instruments, . . .20



452.

452. Boxwood Chain Scale, 12 inches long, graduated on two edges with either 10 and 10 parts, or with 10 and 20 parts, or with 20 and 40 parts, or with 30 and 50 parts, or with 40 and 60 parts, or with 50 and 60 parts, . 1.25

453. Boxwood Off-set Scales, 2 inches long, graduated 10 by 10, 10 by 20, 20 by 40, 30 by 50, 40 by 60, each, ...25



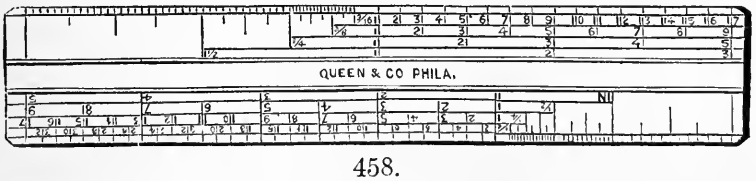
454.

454. Boxwood Scale, 12 inches long, with 16 scales, as follows: $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{4}$, $2\frac{1}{2}$, and 3 inches to the foot, the first division of each scale subdivided in 12 parts, each, ... 1.25

455. Same as No. 454, but with the first division of each scale subdivided into ten parts, each, ... 1.25

456. Boxwood Scale, 12 inches long, with 12 scales, as follows: $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, and 3 inches to the foot, the first division of each scale subdivided into 12 parts, and diagonal scale reading to $\frac{1}{100}$ths and $\frac{1}{200}$ths of an inch, each, ... 1.25

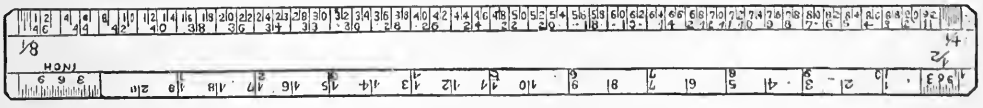
457. Same as No. 456, but has the first division of each scale subdivided into 10 parts, each, ... 1.25



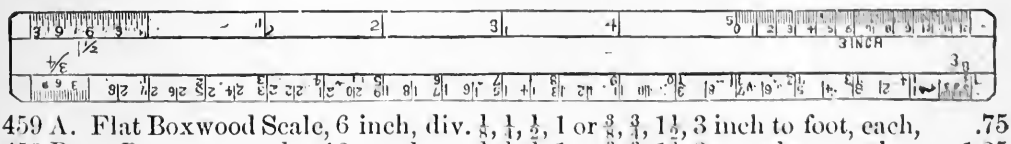
458.

458. Boxwood Scale, 12 inches long, one side rounded, the other flat, with the following scales, the graduations of which are all brought to the edge: $\frac{1}{16}$, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, 2, $2\frac{1}{2}$, and 3 inches to the foot, the first division of each scale subdivided into 12 parts, each, . 1.25

459. Same as No. 458, but has the first division of each scale divided into 10 parts, each, ... 1.25



459 A.



459 A. Flat Boxwood Scale, 6 inch, div. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 or $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 inch to foot, each, .75

459 B. Do. do. 12 do. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 or $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 do. do. 1.25

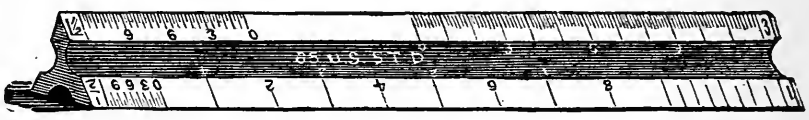
459 C. Do. do. 24 do. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 or $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 do. do. 2.50

459 D. Flat Scale, 12 inch, beveled on both sides, graduated $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, and $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 inches to the foot, each, ... 1.50

No.		Price.
460.	Triangular Scale of Metal, nickel-plated, 12 inches long, graduated, $\frac{3}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{3}{4}$, $\frac{1}{2}$, 1, $1\frac{1}{2}$, 3 inches to the foot and 16ths of inches, .	$3.00
461.	Triangular Scale of Metal, nickel-plated, 12 inches long, graduated, 10, 20, 30, 40, 50, 60 to the inch, ...	3.00

462.

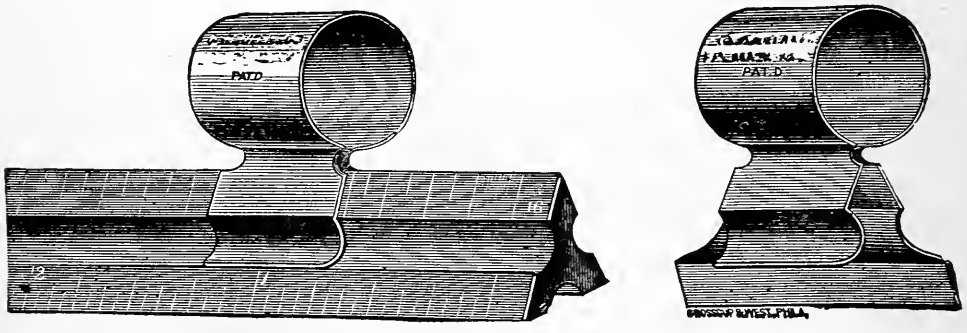
462.	Triangular Scale of Boxwood, 24 inches long, graduated 10, 20, 30, 40, 50, and 60 to the inch; or, 20, 30, 40, 50, 60, and 80 to the inch, .	5.00
463.	Do. do. do. do. 12 inch,	1.50
463½.	Do. do. 12 inches long, graduated 100, 200, 300, 400, 500, 600 to the foot, each, ...	2.00
464.	Do. do. 6 inches, graduated same as No. 462, . .	.80
464½.	Triangular Scales of Boxwood for Off-sets, 2 inches long, 10, 20, 30, 40, 50, and 60 parts, ...	.75



465.

465.	Triangular Scale of Boxwood, 24 inches long, graduated $\frac{3}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 inches and 16ths to the foot, ...	5.00
466.	Do. do. do. 12 inches long,	1.50
467.	Do. do. do. 6 do. .	.80

Boxwood Triangular Scales, 6 and 12 inches, put in strong paper boxes, and mailed to any address at an additional cost per scale of 25 cents.



470.

470.	Triangular Scale Guard, each, ...	.25
	A very useful attachment to the Triangular Scale, to obviate the liability to error, and the loss of time caused by the necessity of a careful examination of the scale each time it is used.	
471.	Gunter Scales, 12 inches, each, ...	.75
472.	Do. 24 do.	1.25
473.	Boxwood School Rule, 12 inches, $\frac{1}{8}$ and $\frac{1}{16}$ inch, ...	.15
474.	Do. do. 12 do. $\frac{1}{8}$ beveled brass edge, . . .	.35
475.	Do. do. 18 do. do. do.	.50

STEEL DRAUGHTING SCALES.

No.		Price.
476.	Flat, Beveled Steel Scales, fully divided on four edges to $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and 1 inch to the foot, each,	$1.75
	Or divided to $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, and 3 inches to the foot,	1.75
477.	Same as above, but divided only on two edges, with scales of $\frac{1}{8}$ and $\frac{1}{4}$ inch to the foot, each,	1.50
	Or $\frac{1}{2}$ and 1 inch to the foot, each,	1.50
	Or $\frac{3}{8}$ and $\frac{3}{4}$ inch to the foot, each,	1.50
	Or $1\frac{1}{2}$ and 3 inches to the foot, each,	1.50
478.	Same as above, but beveled on both sides, graduated $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and 1, and $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, and 3 inches to the foot, each,	2.00

METRIC SCALES AND RULES.

Flat Boxwood, fully divided.

10	20	30	50 cm. long.
$0.60	$0.90	$1.25	$1.75 each.

Ivory Flat, 2.25 4.00 5.00 each.

Triangular Boxwood, 20 30 cm. long.

$1.50 $2.00

Metric Rule, boxwood, 1 meter, 6 fold, with springs at each joint,	.75
Metric Rule, boxwood, 1 meter, 4 fold, divided inches and meter, each,	.60
Same as above, but in ivory,	1.75
Same as above, but in ivory, $\frac{1}{2}$ m. in length,	1.00
Engineer's Metric Rule, 4 foot. 8 fold, divided to inches and meters, each,	.75

PAPER SCALES.

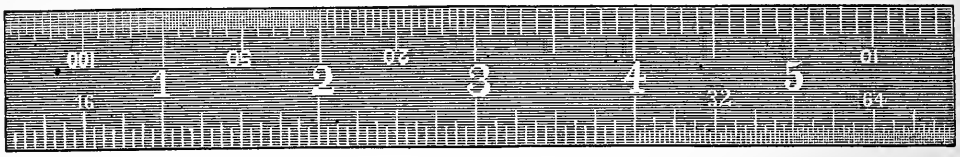
480.	Paper Scale, printed on card-paper, $1\frac{1}{2}$ inch wide, 12 inches long, graduations on one edge inches and 10ths, and the other feet and 100ths,	.10
481.	Paper Scale, same as 480, one edge 20 parts to the inch, the other edge 40,	.10
482.	Paper Scales, same as 481, one edge inches and sixteenths, the other edge inches and forty-eighths,	.10
483.	Paper Scale, printed on card-paper, 19 inches long, for architects and engineers, in sets of 6 scales, per set,	1.00
	Series A contains 6 scales, one each, divided to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, and 3 inches to the foot.	
	Series B contains 6 scales, one each, divided to $\frac{3}{32}$, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{5}{16}$, $\frac{3}{8}$, and $\frac{7}{8}$ inch to the foot.	
	Series C contains 6 scales, one each, divided to 10, 20, 30, 40, 50, and 60 parts to the inch.	
484.	Single Scale of any of the above series, A, B, C—each scale,	.20
485.	Paper Scales, same as 483, divided either to $\frac{5}{8}$, $1\frac{1}{8}$, $1\frac{1}{4}$, or $1\frac{3}{8}$ inches to the foot, each,	.20

The advantages of these scales are, they expand and contract nearly the same as drawing-paper, do not soil the work, and distances can be set off from them without the use of dividers.

We manufacture to order Scales to any divisions, in ivory, boxwood, whitewood, or rubber

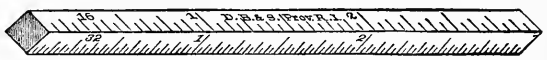
CHAPTER VIII.

SQUARES, CALIPERS FOR MACHINISTS, STRAIGHT EDGES.



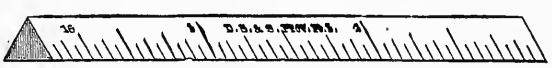
500.

No.					Price.
500.	24-inch Steel Rule, graduated to inches, 8ths, 10ths, 12ths, 16ths, 20ths, 24ths, 32ds, 48ths, 50ths, 64ths, and 100ths of an inch,				$4.00
501.	12 inches,	do.	do.	do.	2.00
502.	9 do.	do.	do.	do.	1.50
503.	6 do.	do.	do.	do.	1.00
504.	4 do.	do.	do.	do.	.75
505.	3 do.	do.	do.	do.	.50
506.	Steel Rule and Scale, 12 inches long, divided in inches and 16ths on one side, and inches and 12ths or 10ths on the other,				.75
507.	Same as 506, but divided in inches and 16ths on one side, and inches, 8ths, 32ds, and 64ths on the other,				1.00
508.	Same as 506, but divided in inches and 16ths on one side, and centimeters and millimeters on other side,				1.25
509.	Steel Shrink Rule, $24\frac{1}{4}$ inches long, graduated as No. 500,				4.50
510.	Boxwood Shrink Rule, $24\frac{1}{4}$ inches long, graduated as No. 500,				3.00
511.	Steel Standard Yard Measure, graduated to inches and 8ths on one side, and on the other side to $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, and $\frac{7}{8}$ of a yard,				3.00
512.	Steel Standard French Measures, subdivided to centimeters and millimeters. $\frac{1}{5}$ meter long, $1.75; $\frac{3}{16}$ do., $2.50; $\frac{1}{2}$ do., $4.00; 1 do.,				10.00



513.

513. Square Steel Rules, divided to 8ths, 16ths, 32ds, 64ths, and 100 parts to the inch, . . 3 inches long, 50 cts.; 4 ins., 75 cts.; 6 ins., 1.00



514.

514. Triangular Steel Rules, 3 inches long, divided to 12, 16, 20, 24, 32, 48, 50, 64, and 100 parts to the inch, ... 0.60
4 inch, 80 cts.; 6 inch, $1.20; 12 inch, 3.00

514½. Centre Gauge, and Gauge for Grinding and Setting Screw Tools, . .50

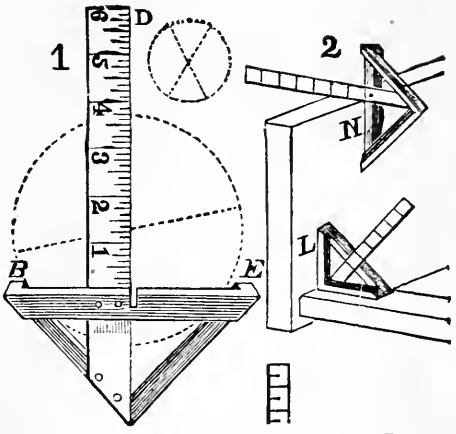
The angles used in this Gauge are 60 degrees. The four divisions upon the Gauge of 14, 20, 24, and 32 parts to the inch, are very useful in measuring the number of threads to the inch of taps and screws. The following parts to the inch can be determined by them, viz.: 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 20, 24, and 32.

☞ *Any of the above Scales nickel-plated for five cents per running inch.*

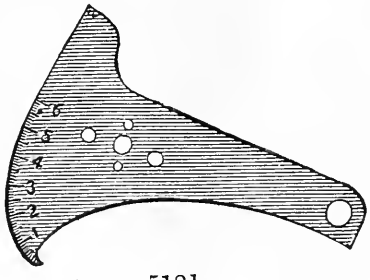
AMES' PATENT UNIVERSAL SQUARE.

This square combines, in a most convenient form, *five different instruments*, viz., The TRY-SQUARE, the MITER, the T-SQUARE, the GRADUATED RULE, and (what is entirely new) the CENTRE-SQUARE, for finding the centre of a circle.

Fig. 1 explains its application as a CENTRE-SQUARE. Put the instrument over the circle, as the end of the bolt or shaft, with the arms B A, A E resting against the circumference, in which position one edge of the rule, A D, will cross the centre. Mark a straight line in this position; apply the instrument again to another part of the circumference, and mark another line crossing the first. The point where the two lines cross each other will be the centre of the circle. The whole is the work of a moment. *Fig.* 2 explains the application of the instrument as a carpenter's TRY-SQUARE, N, and an OUTSIDE SQUARE.



No.					PRICE.
515.	Ames' Patent Universal Square,	blade 6	inches	long,	$3.00
516.	Do.	do.	8	do.	4.00
517.	Do.	do.	10	do.	5.50
518.	Do.	do.	12	do.	7.00



518½.

Robinson's New Templet Odontograph is a ready-made Scribe Templet of universal application for describing Teeth of Gear Wheels.

Price, in morocco case, with Rules and Tables,	3.00
Treatise on the above Odontograph, by Prof. S. W. Robinson,	.50

WILLIS' ODONTOGRAPH.

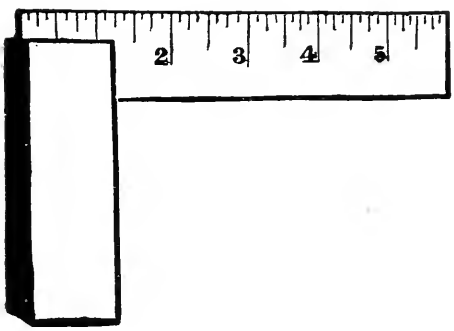
This is an instrument recently invented by Prof. R. Willis, of Cambridge University, England, for describing the correct form of the teeth of wheels, and the templets and cutters used in making them. All wheels of the same pitch, but of different sizes, having their teeth drawn with this instrument, will run together correctly.

519. Willis' Odontograph, for drawing the teeth of small wheels by diametrical pitch, when only a single arc is required, with drawing and direction for use, ... 2.50

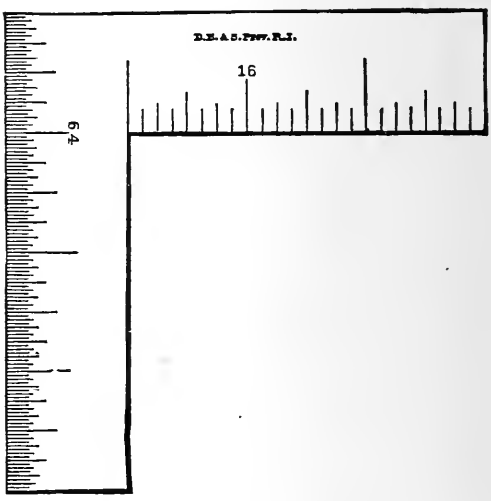
520. Willis' Odontograph, for drawing the teeth of larger wheels by circular pitch, where it is necessary to have separate arcs for flanks and faces, with drawing and direction for use, ... 4.00

520½. Willis Odontograph, on Bristol-board, revised by Prof. W. D. Marks, University of Pennsylvania, giving additional tables, explanation, and formula, making it of universal application, ...75

No.						PRICE.
521.	Heavy-headed Square, made of hardened steel, for machinists, graduated to inches and 32ds of an inch, blade 3 inches long,					$2.50
522.	Do.	do.	do.	4	do.	3.00
523.	Do.	do.	do.	6	do.	4.00
524.	Do.	do.	do.	9	do.	7.00
525.	Do.	do.	do.	12	do.	8.00



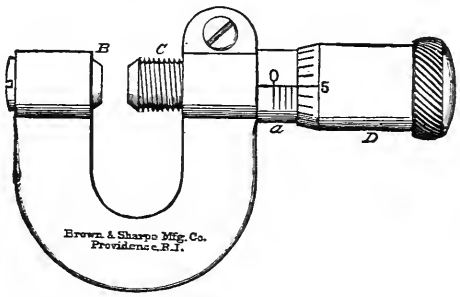
521.



526.

526. Light Squares, made of steel, for machinists, graduated on one side to inches, 16ths, and 64ths of an inch, and on the other side to inches, 32ds, and 64ths of an inch, sides 3 inches long, ... 2.50
528. Same as No. 526, sides 4 inches long, graduated on both sides to inches, 16ths, and 32ds of an inch, ... 3.00
529. Same as No. 527, sides 6 inches long, ... 4.00

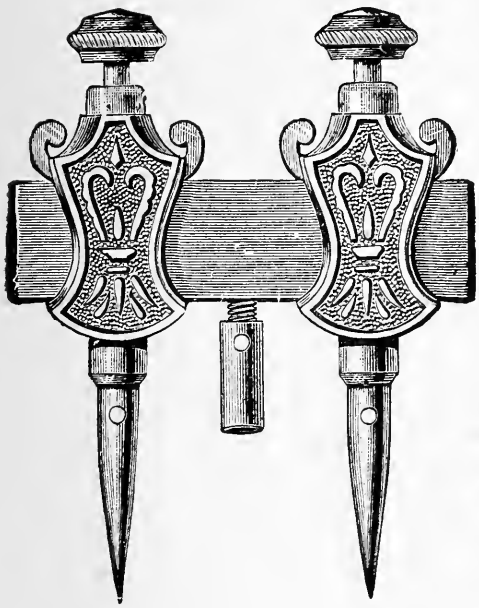
Any of the above Squares nickel-plated for five cents per inch of blade.



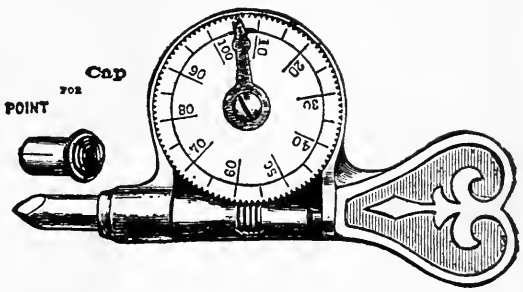
530. Micrometer Caliper for Machinists' use, in morocco case, . . . 6.50
530. Do. do. do. without case, . . . 6.00

This is the most convenient form of Pocket Vernier Caliper; it can be used for all diameters less than one inch, and with the vernier reads to 1000ths of an inch.

IMPROVED TRAMMEL POINTS.



532.

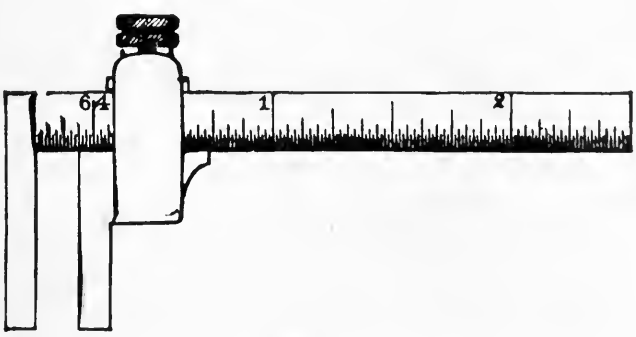


534.

These tools are used by all machinists and mechanics who have occasion to strike arcs or circles larger than can be done by compass dividers. They may be used on a straight wooden bar of any length, and when secured in position by the thumb-screws, all circular work can be readily laid out. They are made of bronze, and have steel points, either of which can be renewed, and replaced by pencil socket, which accompanies each pair.

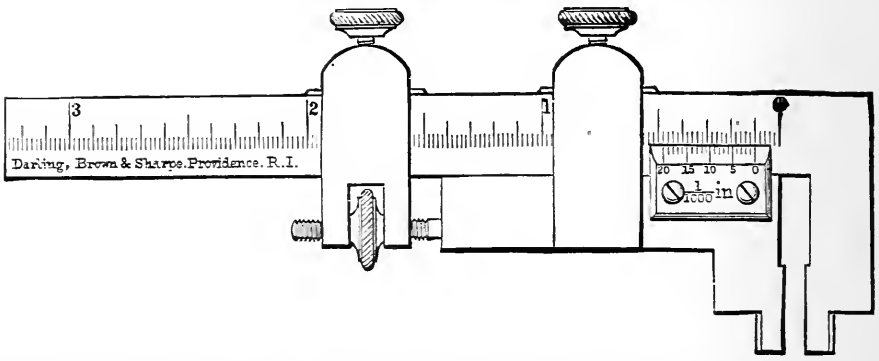
No.		Price.
531.	Small (No. 1), per pair,	$1.50
532.	Medium (No. 2), per pair,	2.00
533.	Large (No. 3), per pair,	2.75
534.	Speed Indicator,	2.00

STEEL CALIPERS.



535.

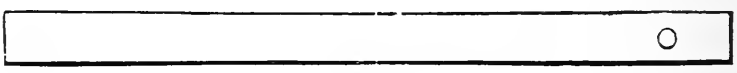
535.	Plain Steel Caliper, 2 inches long, graduated to 64ths of an inch,	4.00
536.	Do. do. 3 do. divided to 64ths of an inch,	5.00



These instruments can be furnished with millimeters (in the place of sixty-fourths of an inch), and provided with a vernier to read to one-fiftieth of a millimeter.

The cut is a fac-simile of one side of our hardened cast-steel Improved Vernier Caliper, a light, convenient, and valuable instrument for machinists' and tool-makers' use in obtaining correct measurements. The side represented above is graduated upon the bar to inches and fiftieths of an inch, and by the aid of a vernier is read to one-thousandths of an inch. The opposite side is graduated to inches and sixty-fourths of an inch. The outside of the jaws are of suitable form for taking inside measurements, and when the jaws are closed measure 250 one-thousandths of an inch in diameter. This Caliper will measure one inch and eleven-sixteenths, outside diameter, when the jaws are opened full size.

No.		Price.
537.	Vernier Steel Caliper, as shown above, in morocco case,	$12.50
539.	Pearwood Ovals, 2 to 6 inches long, 10 in a set, per set,	2.00
540.	Do. 1½ to 4½ do. 6 do. do.	1.50
541.	Do. ¾ to 7 do. 43 do. do.	5.00
542.	Pearwood Hyperbolas, 2 to 5 inches long, 8 in a set,	1.40
543.	Do. Parabolas, 12 do.	3.00
544.	Do. do. 1½ to 6 inches long, 8 do.	1.40



545.

545. Whitewood, beveled edge, thick,

	12	18	24	30	36	42 inch.
each,	$0.15	.20	.25	.30	.40	.50.

546.

546. Hardwood lined, square edges, thin:

	24	30	36	42	48	54 inch.
each,	$0.40	.50	.70	.85	1.15	1.50.

547.

547 Mahogany, ebony lined, square edges, thin:

	24	30	36	42	48	54 inch.
each,	$0.55	.70	1.00	1.25	1.60	2.00.

548.

No.

548. Hard Rubber Rulers.

	12	18	24	30	36	42 inch.
each,	$0.50	.70	1.00	1.50	2.00	2.50

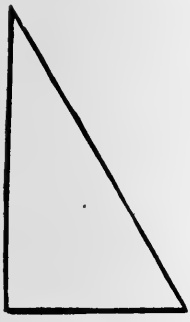
549. Steel, with one edge beveled, the other square.

	18	24	30	36	42	48	60	72 inches long.
each,	$1.50	2.75	3.50	4.50	5.25	6.00	9.00	11.50

550. Steel, one edge beveled, the other square, nickel-plated.

	18	24	30	36	42	48	60	72 inches long.
each,	$1.75	3.00	4.00	5.00	6.00	8.00	10.50	14.00

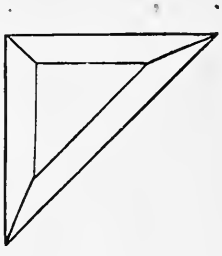
TRIANGLES.



560.

561.

562.



563.

560. Pearwood Triangles, 30°x60°x90°.

5 or 6½	8 or 9½	11 or 12 inches long.
10 cents.	15 cents.	20 cents.

561. Pearwood Triangles, 45°x45°x90°.

4, 5, or 6 inch,	7 or 8 inches long.
15 cents.	20 cents.

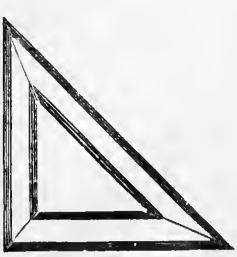
562. Pearwood or Cherry Triangles, framed open centre, 30°x60°x90°.

5	7	9	12	14	16	19 inches long.
$0.20	.25	.25	.30	.40	.75	1.00

563. Pearwood or Cherry Triangles, framed open centre, 45°x45°x90°.

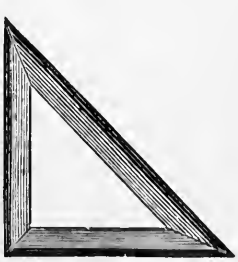
5	6½	8	10	12	14 inches long.
$0.20	.25	.30	.40	.60	.75

564.



565.

564.



565.

564. Mahogany or Walnut Triangles, ebony or maple lined, framed open centre, 30°x60°x90°.

5	6	7	9	11	13	15	18 inches long.
	$0.50	.60	.70	.80	1.00	1.25	1.75

565. Mahogany or Walnut Triangles, ebony or maple lined, framed open centre, 45°x45°x90°.

5	6	7½	9	11	13	15 inches long.
$0.50	.60	.70	.80	1.00	1.25	1.75

600. 600.

No.

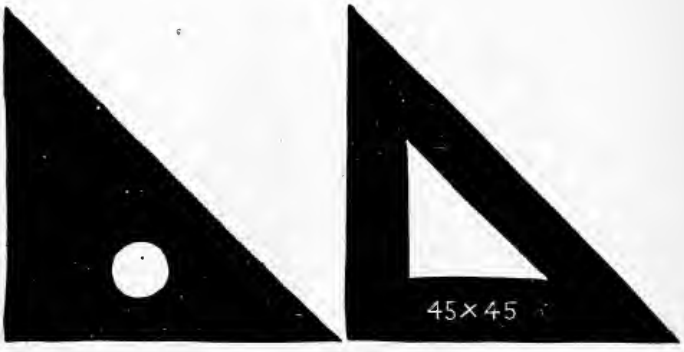
600. Hard Rubber Triangles, angles 30x60x90, or 22½x67½ degrees, either solid or with open centre.

Perpendiculars, 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 ins.
$.0.25 .25 .30 .35 .40 .55 .60 .65 .75 .95 1.10 1.25 1.50 1.75 2.00 each.

601.

601. Hard Rubber Triangles, angles 30x60x90 degrees, extra heavy, open centre.

Isoscles sides, 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 ins.
$0.35 .40 .45 .50 .60 .70 .80 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 each.



603.

603. Hard Rubber Triangles, angles 45x45x90 degrees, either solid or with open centre.

Isoscles sides, 3 4 5 6 7 8 9 10 11 12 13 14 ins.
$0.30 .30 .40 .50 .60 .70 .85 1.10 1.25 1.35 1.50 1.65 each.

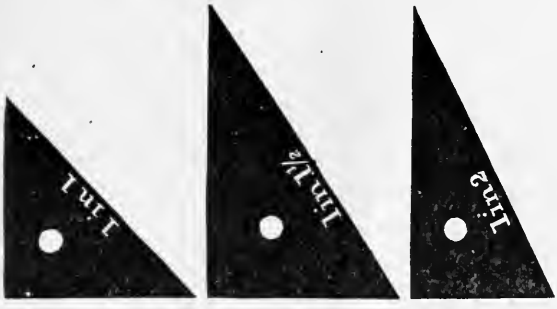
604.

No. PRICE.

604. Hard Rubber Triangles, angles 45x45x90 degrees, extra heavy, open centre.

Isosceles sides, 5 6 7 8 9 10 11 12 13 14 15 16 17 18 ins.
$0.50 .60 .70 .80 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.50 3.75 each.

CROSS SECTION TRIANGLES.



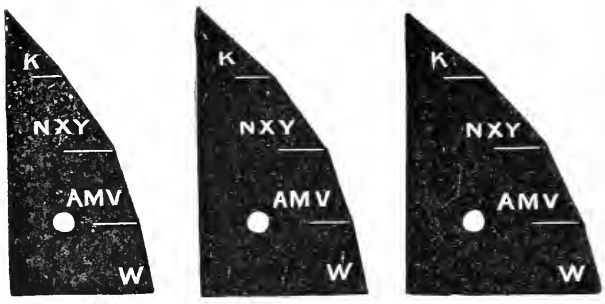
606.

606. Cross Section Triangles, set of seven Cross Section Triangles, made of hard rubber, as follows, ¼ to 1, ½ to 1, ¾ to 1, 1 to 1, 1¼ to 1, 1½ to 1, 2 to 1, per set, ... $4.25
Single Triangles, each, ...75

BATTER SLOPES.

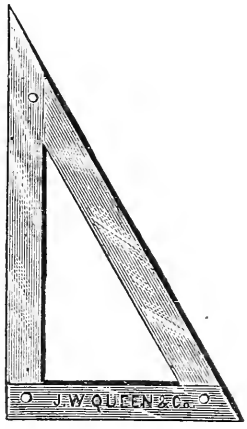
607.

607. Set of three forms of hard rubber for Batters of walls and rock, giving the following slopes, 1 in 4, 1 in 5, 1 in 6, 1 in 8, 1 in 10, 1 in 12, per set, ... 2.00
Single Triangles, each, ...75



609.

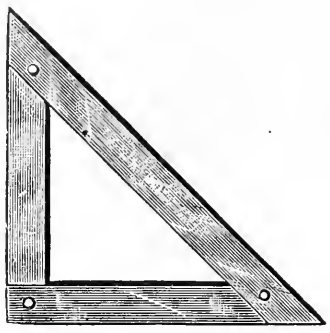
No.		Price.
609.	Hard Rubber Lettering Triangles, three in set, 3½ inches, per set,	$1.25
	Single templets,	.50



610.

610.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 6 inches long, each,	2.50
611.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 7 inches long, each,	2.75
612.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 8 inches long, each,	3.00
613.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 9 inches long, each,	3.50
614.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 10 inches long, each,	4.00
615.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 11 inches long, each,	5.00
616.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 12 inches long, each,	5.50

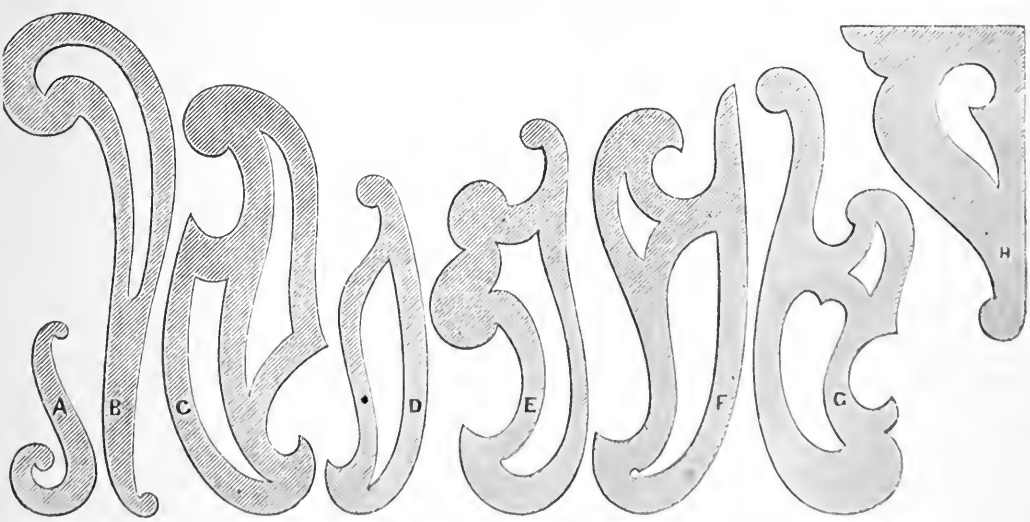
No.		Price.
617.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 14 inches long, each,	$6.00
618.	German Silver Triangle, angles 30, 60, and 90 degrees, perpendicular, 15 inches long, each,	6.50



619.

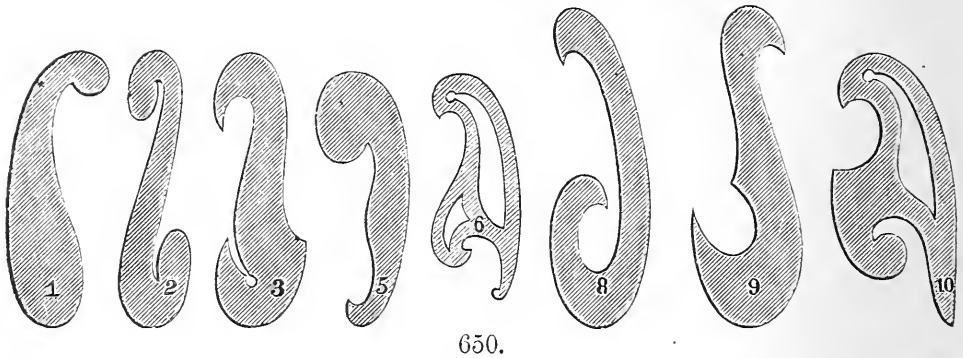
619.	German Silver Triangle, angles 45, 45, and 90 degrees, isosceles sides, 4 inches long,	2.00
620.	German Silver Triangle, angles 45, 45, and 90 degrees, isosceles sides, 5 inches long,	2.25
621.	German Silver Triangle, angles 45, 45, and 90 degrees, isosceles sides, 6 inches long,	2.75
622.	German Silver Triangle, angles 45, 45, and 90 degrees, isosceles sides, 7 inches long,	3.50
623.	German Silver Triangle, angles 45, 45, and 90 degrees, isosceles sides, 8 inches long,	4.00
624.	German Silver Triangle, angles 45, 45, and 90 degrees, isosceles sides, 9 inches long,	4.50
625.	German Silver Triangle, angles 45, 45, and 90 degrees, isosceles sides, 10 inches long,	5.00

IRREGULAR CURVES.



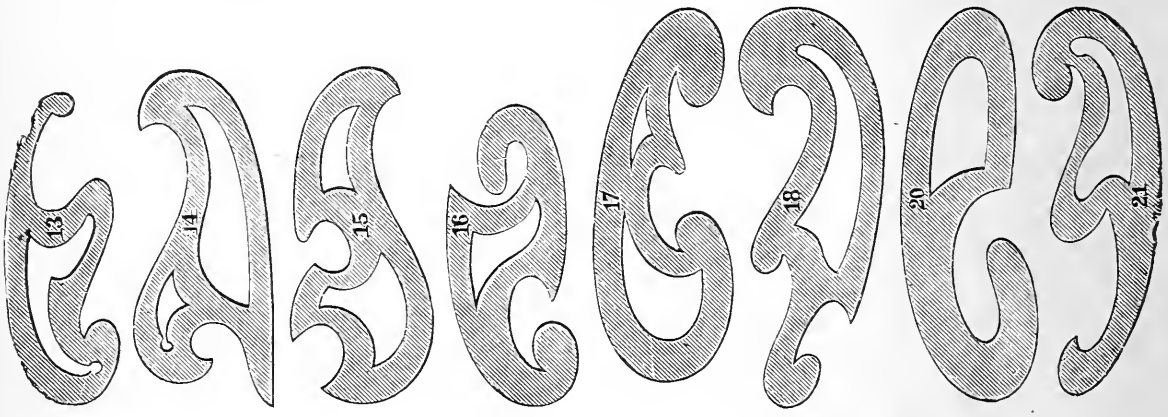
649.

649. Whitewood Irregular Curves, 5 to 15 inches long, various patterns, each, .20



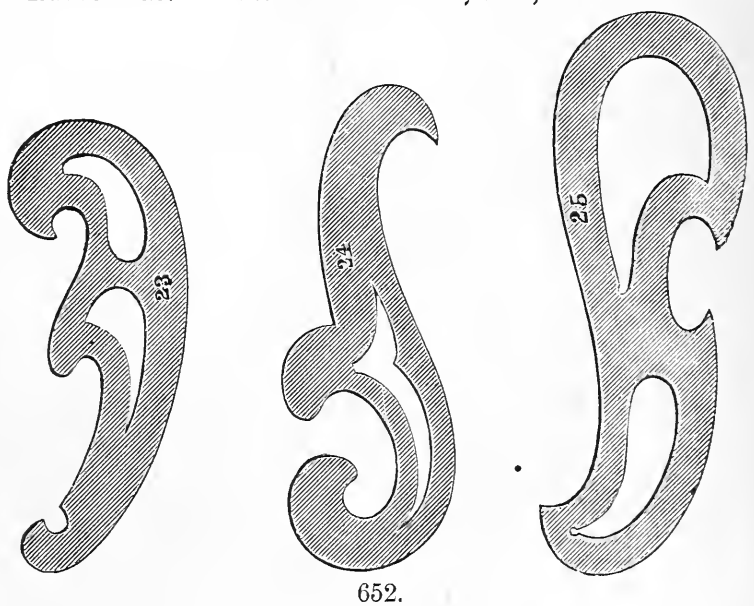
650.

No.		Price.
650.	Whitewood Irregular Curves, of superior quality, Nos. 1 to 6, each, .	$0.15
650½.	Hard Rubber do. do. Nos. 1 to 6, each, 35 cts.; Nos. 8 to 10, each,	.50



651.

651 .	Whitewood Irregular Curves, of superior quality, Nos. 13 to 21, each,	.25
651½.	Hard Rubber do. do. Nos. 13 to 21, each, ...	.75



652.

652.	Whitewood Irregular Curves, of superior quality, Nos. 23 to 25, each,	.55
652½.	Hard Rubber do. do. Nos. 23 and 24, each, $1; No. 25, each,	1.00

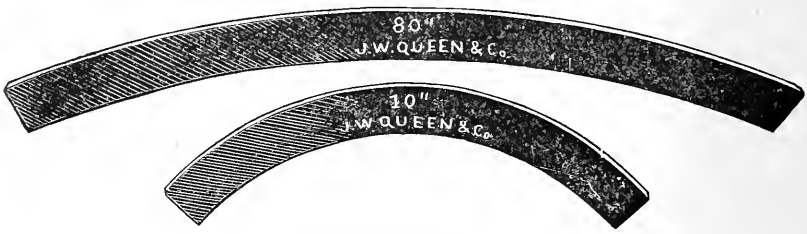
No. 653. PRICE.

653. Hard Rubber and Irregular Ship Curves, 4 to 26 inches long, as used in the United States Navy Yards, complete set in wooden box, . $38.50

654. Single Curves of set No. 653.

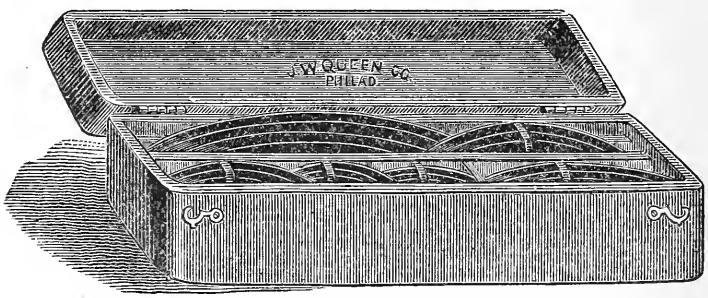
No. 1, 25 cents each; 2, 3, 45 cents; 4, 5, 6, 50 cents; 7, 8, 9, 10, 60 cents; 11, 12, 13, 14, 65 cents; 15, 75 cents; 16, 17, 18, 90 cents; 19, $1.10; 20, 21, 22, 23, $1.60; 24, 25, 35 cents; 26, 27, 28, 29, 30, 45 cents; 31, 32, 70 cents; 33, 34, 60 cents; 35, 36, 37, 70 cents; 38, 39, 40, 41, 42, 90 cents; 43, 44, 45, 46, 47, 48, 49, 50, 51, $1.10.

RAILROAD CURVES OF CARD-BOARD, WOOD, AND RUBBER.



665½.

The following sets of Railroad Curves have been carefully selected, and we believe will answer all the wants of the Engineering profession. We manufacture to order additional sets, cut to any desired scale. Our Curves are finished with the greatest care, and their large and increasing sale throughout the United States and Canada, warrant us in claiming them to be more accurate and reliable than any others in the market.

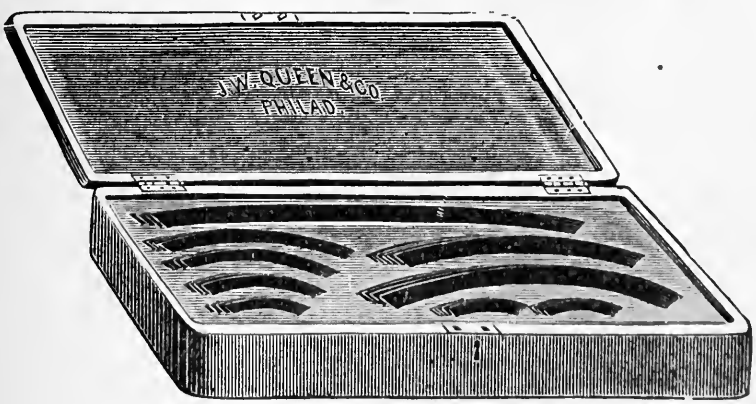


667½.

The following Curves are cut to a scale of inches, the outside of arcs only finished.

No.					PRICE.
660A.	Set of ten Curves, from 12 to 120 inches radius, varying every 12 inches:				
	Set, complete, of	card-board,	in box,	. . . . .	$3.00
	Do. do.	wood,	do.	. . . . .	4.50
	Do. do.	rubber,	do.	. . . . .	8.00
660B.	Set of seventeen Curves, from 12 to 60 inches radius, varying every 3 inches:				
	Set, complete, of	card-board,	in box,	. . . . .	5.00
	Do. do.	wood,	do.	. . . . .	7.50
	Do. do.	rubber,	do.	. . . . .	14.00
660C.	Set of twenty-four Curves, from 1½ to 24 inches radius, Varying ½″ from 1½″ to 10″, Do. 2″ from 10″ to 24″,				
	Set, complete, of	card-board,	in box,	. . . . .	7.50
	Do. do.	wood,	do.	. . . . .	10.00
	Do. do.	rubber,	do.	. . . . .	17.00

No.		Price.
660 D.	Set of forty-three Curves, from 3½ to 200 inches radius, Varying every ½″ to 10″. Do. do. 2″ to 24″. Do. do. 3″ to 42″. Do. do. 6″ to 90″. Do. do. 10″ to 140″. Do. do. 20″ to 200″.	
	Set, complete, of wood, in box, ...	$16.00
	Do. do. rubber, do.	27.50
660 E.	Set of one hundred Curves, from 2 to 100 inches radius, varying every inch, with inside and outside of arcs finished:	
	Set, complete, of wood, in box, ...	46.00
	Do. do. rubber, do.	70.00
660 F.	Set of one hundred and two Curves, from 3 to 200 inches radius, with 3 inches of tangent to each curve. Length of Curves, with tangent, from 7 to 21 inches:	
	Set, complete, of rubber, in box, ...	100.00
	The following Curves are cut to a scale of 50 feet to the inch, and have both inside and outside of arcs finished:	
661 A.	Set of fifteen Curves, rising every 3″ to 3°, then single degrees to 12°:	
	Set, complete, of wood, in box, ...	7.50
	Do. do. rubber, do.	12.00
661 B.	Set of twenty Curves, rising every 30″ to 10°:	
	Set, complete, of wood, in box, ...	12.00
	Do. do. rubber, do.	16.00
661 C.	Set of fifty Curves, from 25″ to 3° by every 5″, and from 3° to 5° by every 15″, 5° to 10° by every 30″:	
	Set, complete, of wood, in box, ...	25.00
	Do. do. rubber, do.	35.00



661 D.	Same as 661 C, but with 3 inches of tangent to each Curve:	
	Set, complete, of rubber, in box, ...	50.00
	Sets 662 A and B are cut to a scale of 100 feet to the inch, and have both inside and outside of arcs finished.	
662 A.	Set of twenty-four Curves, from 30″ to 12° by 30″:	
	Set, complete, of wood, in case, ...	14.50
	Do. do. rubber, do.	19.00

No.		Price.
662 B.	Set of seventy Curves, from 15″ to 4° by every 5″, 4° to 10° by every 15″:	
	Set, complete, of wood, in case, ...	$38.00
	Do. do. rubber, do.	56.00
	Sets 663 A and B are cut to a scale of 400 feet to the inch, and are finished only on outside of arc.	
633 A.	Set of twenty Curves, from 30″ to 10° by every 30″:	
	Set, complete, of wood, in case, ...	9.00
	Do. do. rubber, do.	13.00
663 B.	Set of seventy Curves, from 15″ to 4° by every 5″, and from 4° to 10° by every 15″:	
	Set, complete, of wood, in case, ...	30 00
	Do. do. rubber, do.	46.00
668.	Railroad Curve Protractor, of horn, 8 inches diameter, having laid off on it 33 curves, from $\frac{1}{2}$° to 8°, with a radii of 400 feet to the inch, each, ...	2.00

SHIP CURVES.

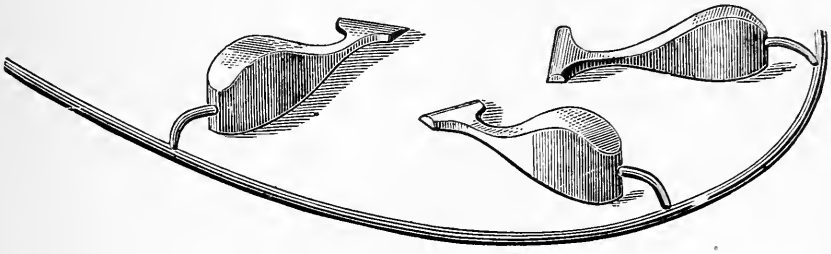
No. PRICE.

668½. Ship Curves, of pearwood, set of 10 curves, per set, ... $5.50

669. Hard Rubber, 28 in set, being Nos. 23 to 51, inclusive, as described in No. 654; set complete in box, ... 20.00

669½. Same as above, but in wood, ... 11.00

These curves were made by us from drawings furnished by the chief draughtsman in the Navy Yard at League Island, and are the standard patterns as used in the United States.



672.

670. Hard Rubber Splines.

12	18	24	30	36	42 inch.
each, $0.25	.30	.35	.40	.45	.50

671. Pearwood Splines, 12 to 36 inches long, from . . . . .15 to .30

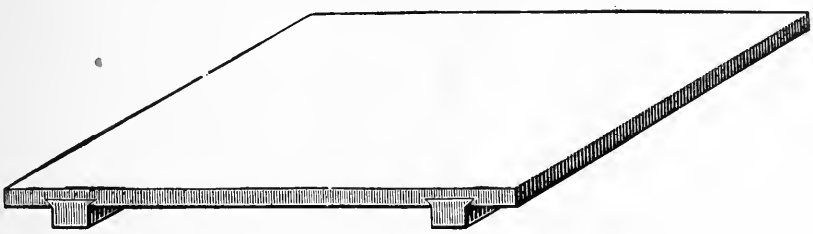
672. Lead Weights for Splines, each, ... 1.50

673. Lead Paper Weights, covered with leather, each, ... 1.00

674. Iron Paper Weights, round with knob, small, each, ...60

675. Do. do. square with knob, large, each, ... 1.00

DRAWING BOARDS.



677.

677. Drawing Board, of pinewood, well seasoned, dove-tailed, hardwood batten,

Do. do. cap size, 12 by 17 inches, each, ...75

Do. do. demy size, 16 by 21 inches, each, ... 1.15

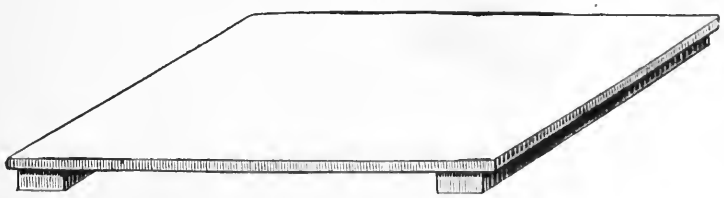
Do. do. superroyal size, 20 by 28 inches, each, ... 1.50

Do. do. imperial size, 23 by 31 inches, each, ... 2.50

Do. do. atlas size, 27 by 34 inches, each, ... 2.50

Do. do. double elephant size, 28 by 42 inches, each, . . 2.75

Do. do. antiquarian size, 33 by 54 inches, ... 5.00



678.

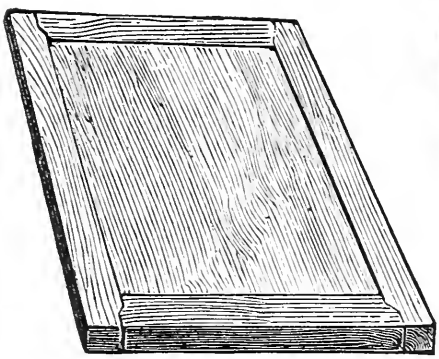
678. Drawing Board, pinewood, hardwood battens screwed to the back. The screws run in slots, to allow free contraction or expansion.

Do. do. demy size, 16 by 21 inches, each, ... 1.50

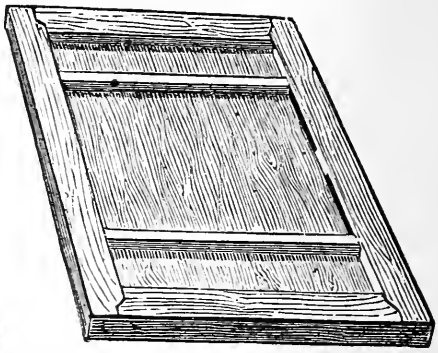
Do. do. royal size, 20 by 26 inches, each, ... 2.25

Do. do. imperial size, 23 by 31 inches, each, ... 3.50

Do. do. double elephant, 28 by 42 inches, each, . . . 5.50

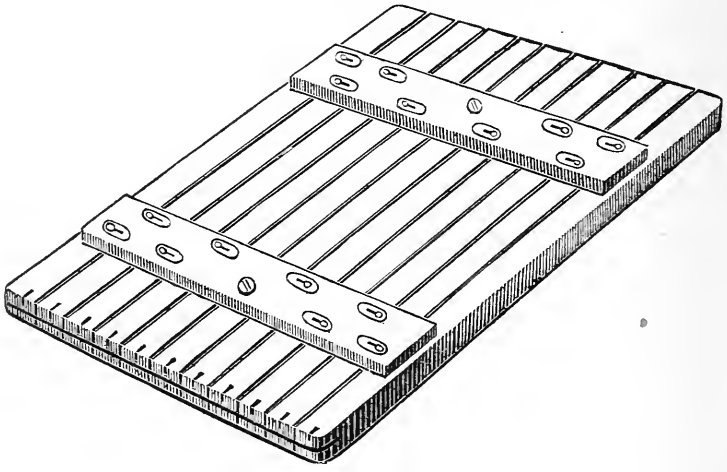


679.



679.

No.			Price.
679.	Walnut-framed Drawing Board, centre of pine and removable.		
	Do.	do. half royal size, 10½ by 17 inches,	$2.00
	Do.	do. half imperial size, 14 by 19 inches,	2.50
	Do.	do. royal size, 17 by 22 inches,	3.50
	Do.	do. imperial size, 19 by 28 inches,	4.50
	Do.	do. double elephant size, 24 by 38 inches,	7.00



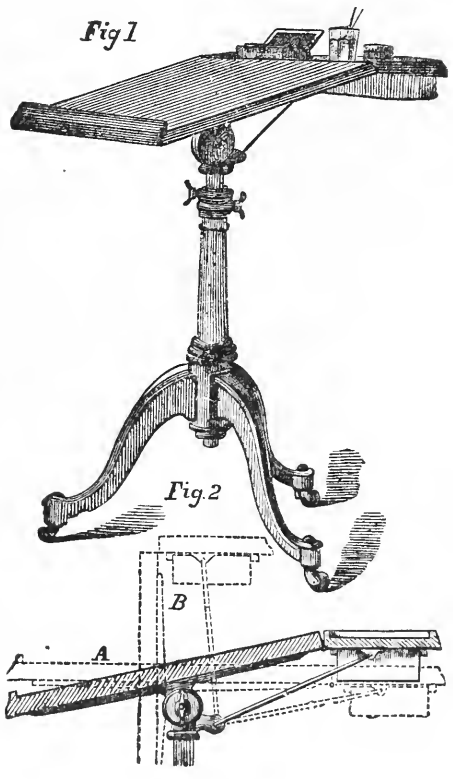
680.

680.	Drawing Board, pinewood, hardwood battens.		
	Do.	do. demy size, 15 by 21 inches,	3.00
	Do.	do. royal size, 20 by 26 inches,	4.50
	Do.	do. imperial size, 23 by 31 inches,	6.00
	Do.	do. double elephant size, 31 by 42 inches,	8.50
	Do.	do. antiquarian size, 33 by 55 inches,	12.00

The Drawing Board above illustrated is the best, and deserves recommendation, as it is the only one which possesses the qualities a good and true board should have. It is made of pinewood, glued up to the required width, with the heart side of each piece of wood to the surface. A pair of hardwood battens are screwed to the back, the screws pass through the ledges in oblong slots, bushed with brass, which fits closely under the heads, and yet allows the screws to move freely when drawn by the contraction of the board. To give the battens power to resist the tendency of the surface to warp, a series of grooves are sunk in half the thickness of the board over the entire back. These grooves take the transverse strength out of the wood to allow it to be controlled by the battens, leaving at the same time the longitudinal strength of the wood nearly unimpaired.

To make the two working edges perfectly smooth, allowing an easy movement with the square, a slip of hardwood is let into the end of the board. The slip is afterward sawn apart at about every inch to admit contraction.

DRAWING TABLES.



681.

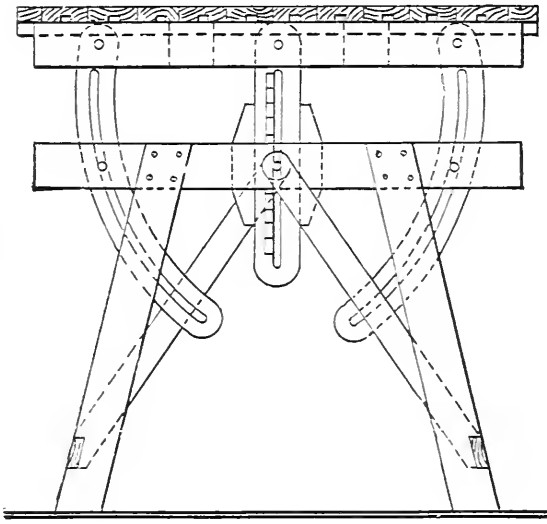
No.		Price.
681.	Drawing Table, black walnut top, 22 by 26 inches, instrument shelf 7 by 26 inches, two instrument drawers, ornamented iron stand mounted on castors, each,	$12.50
682.	Similar to No. 678, top of selected, polished walnut, iron stand, bronzed and tastefully ornamented,	15.50

These tables, suitable for architects' offices, counting-rooms, etc., or for home use, can be readily fixed at any height from 30 to 44 inches, with the top horizontal, vertical, or inclined at any angle, while the instrument shelf and drawers always remain level. In any of these positions the top can be allowed to rotate, or the whole firmly clamped. Total weight, 55 pounds.

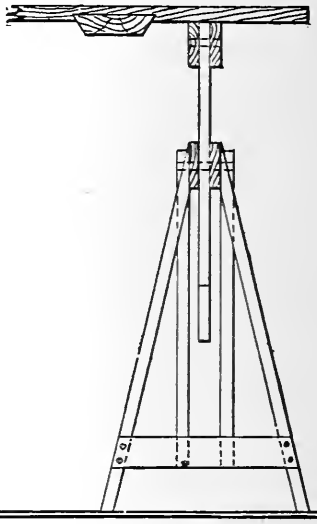
684.

Harden's Patent Adjustable Drawing-Board Trestle.

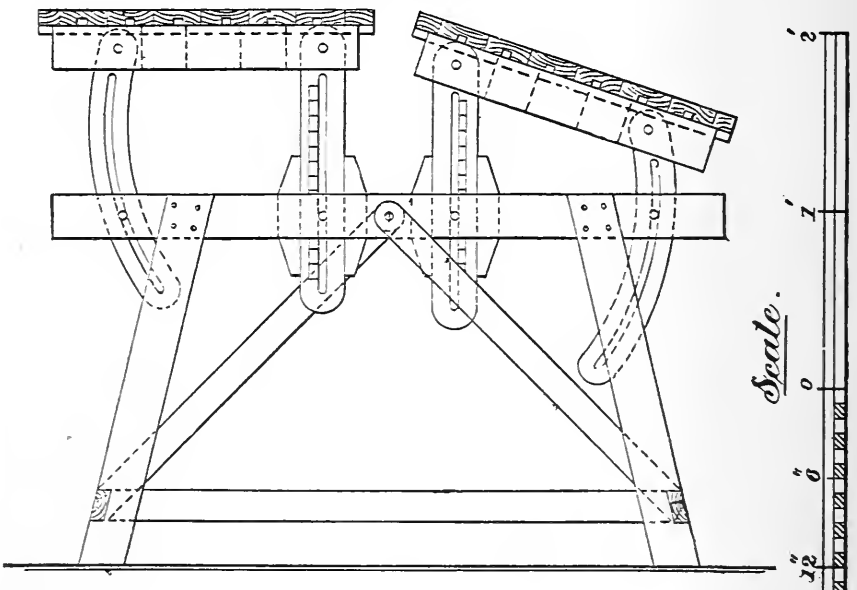
Side Elevation. Fig. 1.



End Elevation. Fig. 2.



Side Elevation. Fig. 3.



Patented Dec 3rd 1873 by J. H. Harden.

The Double Trestle,

685.

684. Single Trestle, per pair, ... $12.00
685. Double Trestle, per pair, ... 15.00

HARDEN'S PATENT ADJUSTABLE DRAWING-BOARD TRESTLE.

This invention consists in the application of curved and straight Slot Links, Thumb-screws, and an additional Bearing-bar to trestles of the ordinary form, by which means adjustment to the height of the Draughtsman is obtained, sitting or standing, from the height of a table to the full height of a drawing board, from the horizontal to any required angle of inclination on either side.

Figures 1 and 2 show side and end elevations of Trestle, suitable for the Artist, Engineer, or Architect's office.

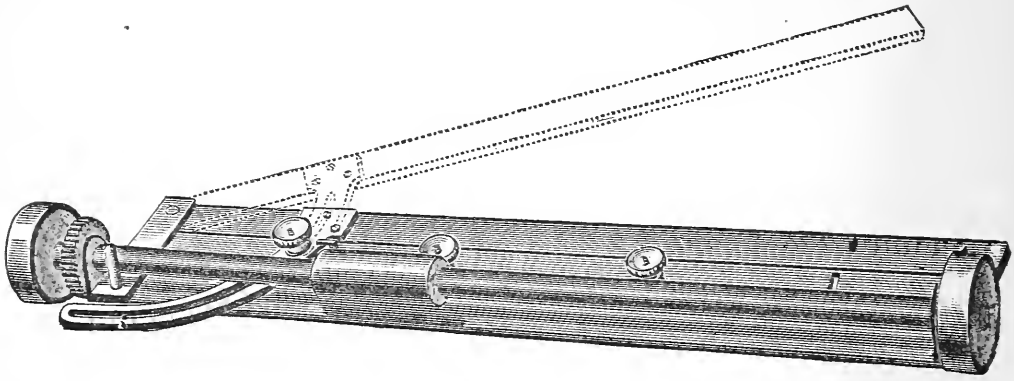
Figure 3 shows the side elevation of a Double Trestle for the use of Mechanics, Schools, and Colleges, or where it may be desirable to economize space.

REFERENCES.—Prof. T. W. Richards, Architect, 3332 Chestnut St., Philadelphia; F. Brotherhood, Taylor Iron Works, Charleston, S. C.; Prof. J. M. Silliman, Lafayette College, Easton, Pa.; Prof. L. M. Haupt, University of Pennsylvania, West Philadelphia; E. B. Coxe, Jeddo, Luzerne Co., Pa.; Prof. J. P. Lesley, State Geologist, 1008 Clinton Street, Philadelphia; Franklin Institute Exhibition (diploma awarded).

DRAWING MODELS.

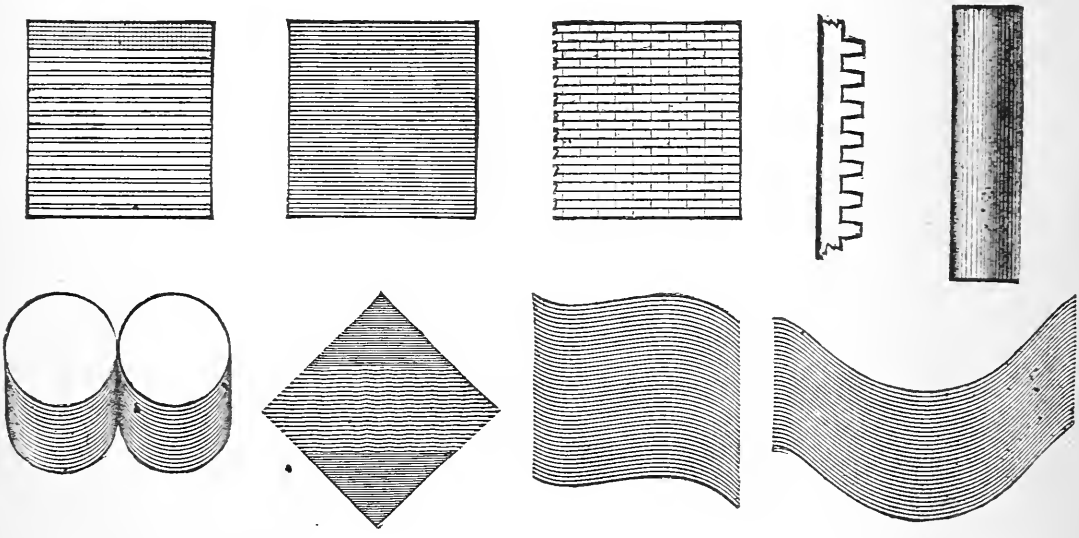
	PRICE
1 set Schröder's Simple Solids, 12 pieces,	$5.00
1 Do. do. do. do. 40 do.	20.00
1 Do. do. complete, 118 do. all mounted, so as to revolve on their axis, very complete,	175.00
683. New American Drawing Models, a set of 27 pieces, consisting of mathematical solids, vases, etc., with stand, complete in a substantial box, per set,	25 00

THE "UNIVERSAL" RULER AND SECTION LINER.



This Ruler combines the following advantages: IT IS ACCURATE, NEAT, SIMPLE, AND DURABLE, being made of steel and brass nickel-plated. The cuts below were drawn with this Ruler, and illustrate a few of the many things which may be done with it. Lines may be drawn in any direction and at any distance apart, from $\frac{1}{100}$ of an inch to any distance desired.

To draw PARALLEL LINES, turn the shaft toward you by the rubber sleeve, and draw the line along the edge of the pivoted arm, *being careful to rotate the shaft in the opposite direction after hearing a click, until it stops.* If a smaller space is required set the pivoted arm at an angle, by means of thumb-nut and slotted-quadrant, drawing the lines along the edge of the arm as before. LARGER SPACES may be obtained by allowing the instrument to give more than one click.



For CURVED OR IRREGULAR WORK, attach the desired curve to Ruler by two thumb-nuts in the centre and proceed as before, using the curve for a ruling edge.

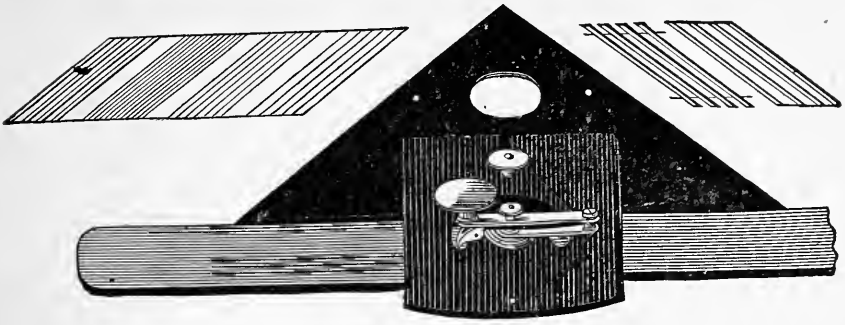
To draw PARALLEL CIRCLES, use the soft centre point on the right hand end of pivoted arm, and draw circles with ordinary circular pen.

To shade cylinders, place the pivoted arm so as to space a very short distance, and draw lines at the required distance apart.

Six-inch Ruler without Centre Point, ...	$4 50
Eight and one-half inch Ruler, with Centre Point.	5 00

A Velvet Lined Case will be supplied for $1.00 extra.

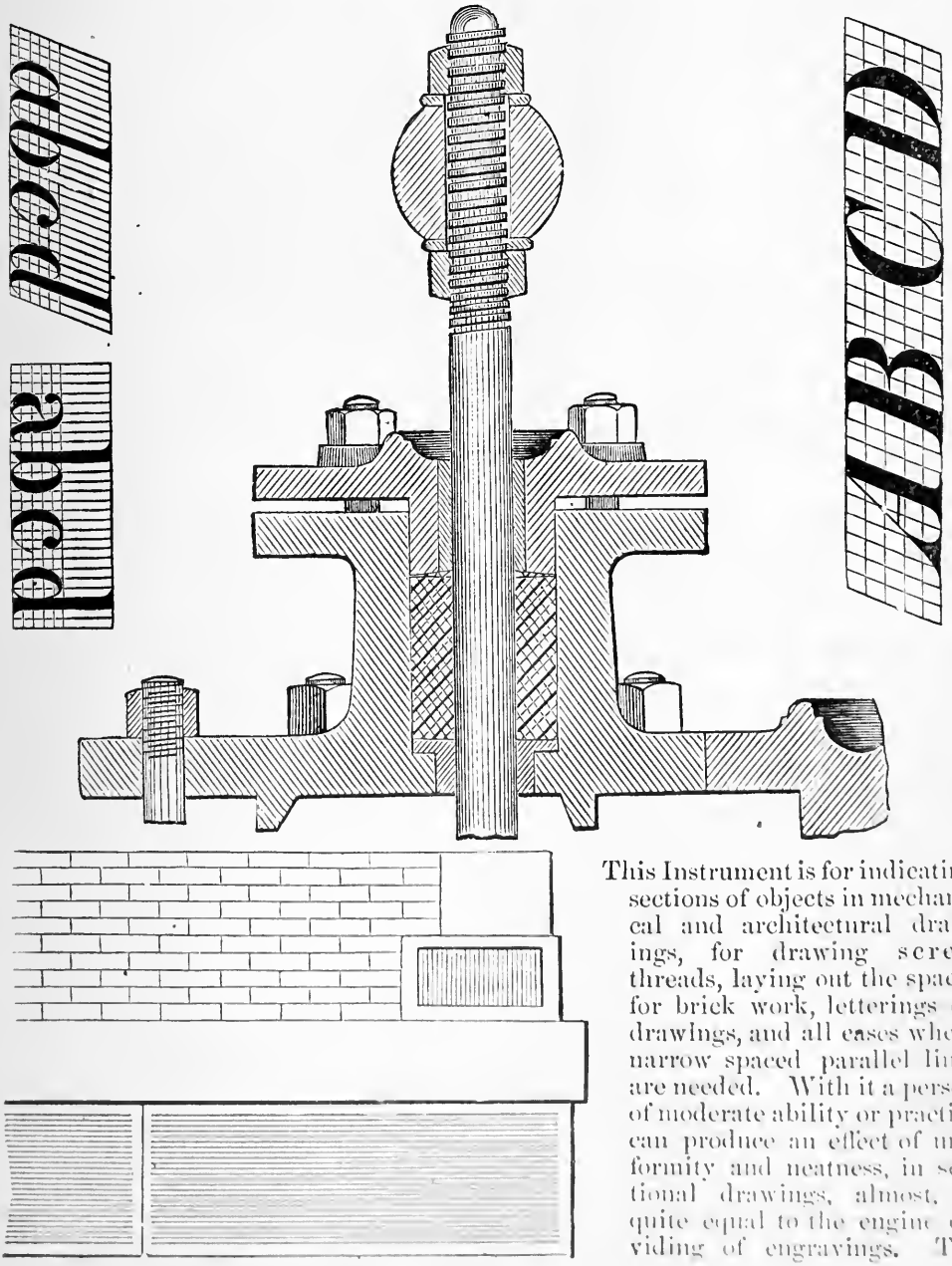
BERGNER'S PATENT SECTION LINER.



686.

686. Bergner's Patent Section Liner, in morocco case, ... $7.50

SAMPLES OF WORK DONE WITH BERGNER'S PATENT SECTION LINER.



This Instrument is for indicating sections of objects in mechanical and architectural drawings, for drawing screw threads, laying out the spaces for brick work, letterings on drawings, and all cases where narrow spaced parallel lines are needed. With it a person of moderate ability or practice can produce an effect of uniformity and neatness, in sectional drawings, almost, or quite equal to the engine dividing of engravings. The

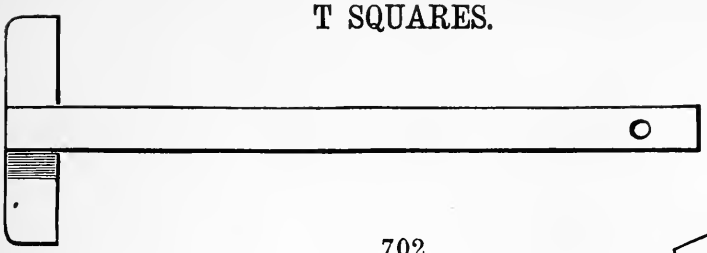
instrument consists of a ruler, covered on the under side with India-rubber cloth, a triangle with a clamping-screw, passing through near one of its edges, and a plate, with the necessary arrangement for producing a movement over equal spaces. The several parts are placed together as represented in the engraving, there being a little spring beneath the front edge of the top plate, which presses against one edge of the ruler, while the triangle is clamped against the other edge. The ruler may be placed upon the paper in any desired position, the India-rubber cloth underneath keeping it there with perfect security, and it thus acts as a guide for the triangle, which can be moved along over equal steps by alternately pressing down the ivory button and letting it spring back. This movement is produced by the action of a little pawl upon the ruler, which is always to be kept pretty sharp, so that it will take a quick and certain hold. The length of the steps taken, or the distance between the lines drawn, is regulated by the screw above the spring, the distance moved over each time being greater as the spring is allowed to have more play. By changing the clamping-screw on the triangle, any edge can be placed against the ruler.

FASTENING TACKS AND HORN CENTRES.

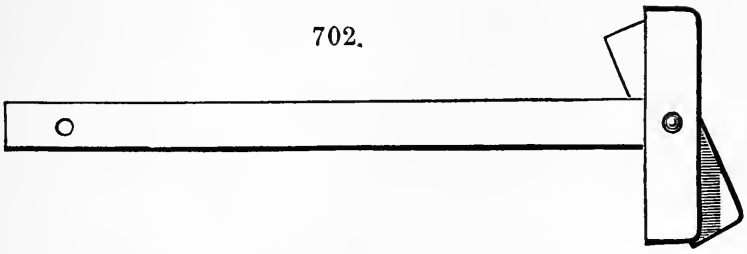
690. 692. 693½. 696. 697. 698. 700.

No.										PRICE.
690.	Fastening Tacks, of Brass, heads flat, ¼ inch diameter,								per doz.,	$0.20
691.	Do.	do.	do.	do.	round, ¼ inch diameter,				do.	.25
692.	Do.	do.	do.	do.	do. 5/16	do.			do.	.35
693.	Do.	do.	of German Silver, heads rounded, ¼ in. diam.,						do.	.45
693½.	Do.	do.	do.	do.	7/16	do.			do.	.50
694.	Do.	do.	do flat heads, 5/16 in. diam., very superior,						do.	.60
694½.	Do.	do.	do.	do.	5/16	do.	second quality,		do.	.30
695.	Do.	do.	do.	do.	7/16	do.	very superior,		do.	.65
695½.	Do.	do.	do.	do.	7/16	do.	second quality,		do.	.40
696.	Do.	do.	do.	do.	½	do.	very superior,		do.	.75
696½.	Do.	do.	do.	do.	½	do.	second quality,		do.	.45
697.	Do.	do.	do.	do.	9/16	do.	very superior,		do.	.85
697½.	Do.	do.	do.	do.	5/8	do.	very superior,		do.	1.00
697½b.	Do.	do.	do.	do.	5/8	do.	second quality,		do.	.55
697¾.	½ inch diameter, extra long Needle Points,								do.	1.00
698.	Fastening Tacks, of Steel, round heads, ¼ inch diameter,								do.	.40
699.	Do.	do.	of Brass, right-angled,						do.	.75
700.	Horn Centre,								each,	.15
701.	Do.	with German Silver Rim,							do.	.35
701½.	Thumb Tack Extractor and Impressor, also Paper Knife. By using this handy little instrument the bending of the pins and wrenching off of the heads are avoided. Price, Nickel Plated,									.25

T SQUARES.



702.



703.

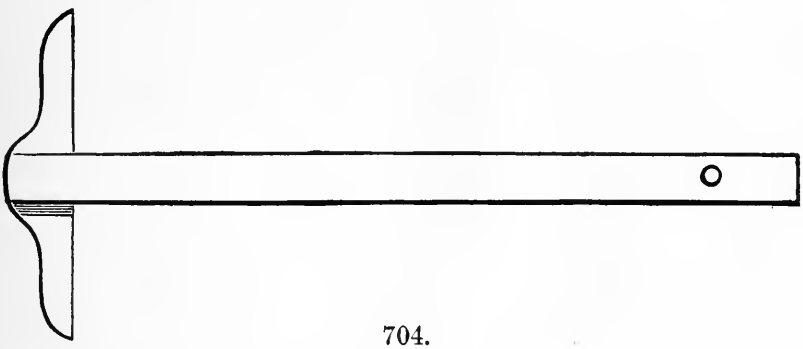
No.

702. Pearwood T Square, fixed head.

15	20	25	30	35	40	45	50	70 inches long.
.30	.45	.45	.50	.65	.85	$1.00	1.25	2.00

703. Pearwood T Square, shifting head.

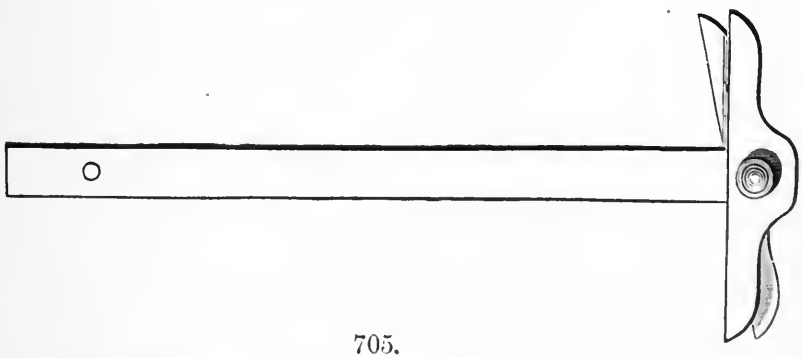
20	25	30	35	40	50	70 inches long.
$1.00	1.00	1.10	1.20	1.50	1.75	2.50



704.

704. Maple Blade, Black Walnut Head, fixed.

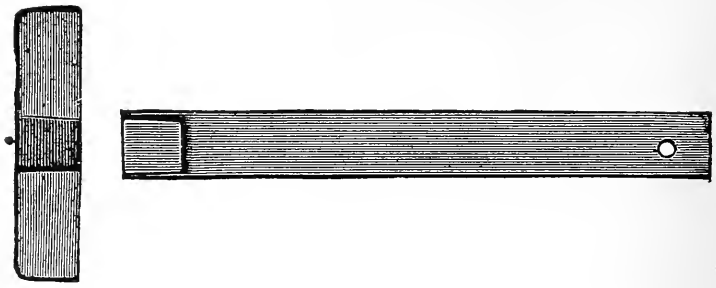
20	25	30	35	50	60 inches long.
.65	.75	.85	$1.00	1.25	1.60



705.

705. Maple Blade, Black Walnut Head, shifting.

20	25	30	40	55 inches long.
$1.10	1.25	1.40	1.60	2.00

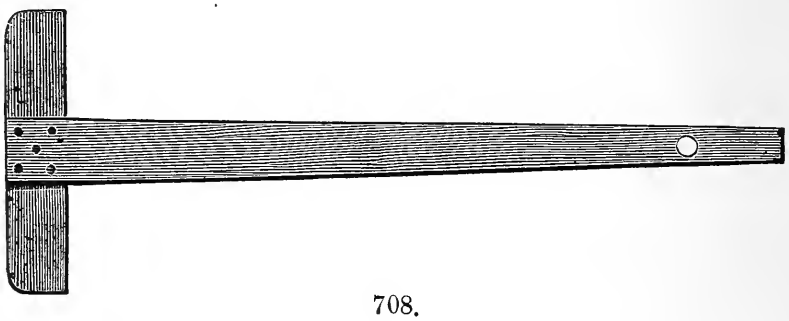


706.

QUEEN'S DOVETAIL SEPARABLE T SQUARE.

The great advantage in above Square is that the head is detachable from the blade, which, without impairing its strength and firmness when fixed, makes it much more convenient for carrying.

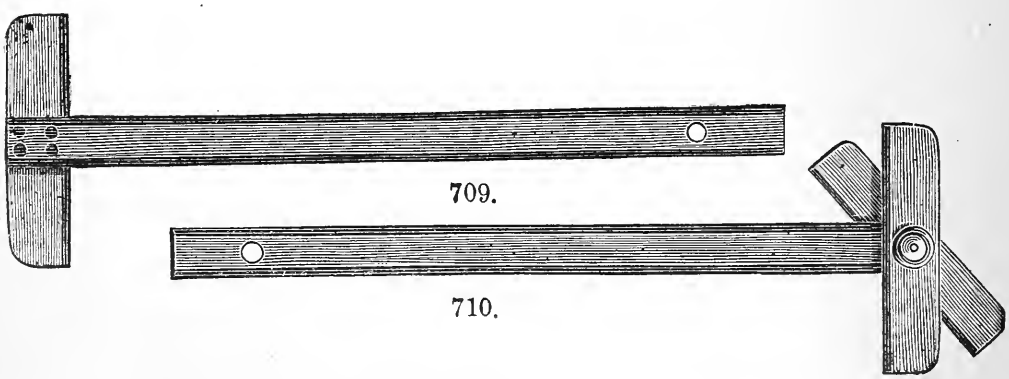
706. Price, 25-inch Blade, 60 cents; 30-inch Blade, 75 cents; 35-inch Blade, 90 cents.



708.

708. Hardwood Blade, tapered, Black Walnut Head.

30	40	50 inches long.
$1.25	1.75	2.00



709.

710.

709. Mahogany, Ebony lined, fixed heads.

25	30	35	42	50	60 inches long.
$1.25	1.50	1.75	2.00	2.50	4.00

710. Mahogany, Ebony lined, shifting head.

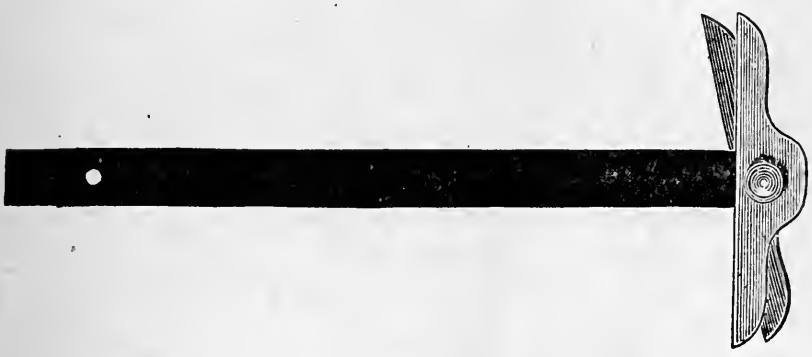
25	30	35	42	50	60 inches long.
$2.25	2 50	2.75	3 25	3.50	5.00

711.

No. PRICE.

711. Rubber Blades, Black Walnut Head, fixed.

12	15	20	25	30	36 inches long.
.60	.65	.80	$1.00	1.25	1.75



712.

712. Rubber Blades, Black Walnut Head, shifting.

15	20	25	30	35 inches long.
$1.50	1.75	2.00	2.50	2.75

713. Steel Blades, Nickel Plated, Japanned Iron Heads.

18	24	30	35 inches long.
$3.25	4.50	5.50	6.50

714. Steel Blades, Nickel Plated, Japanned Iron Heads, shifting head.

18	24	30	35 inches long.
$4.75	6.00	7.00	8.00

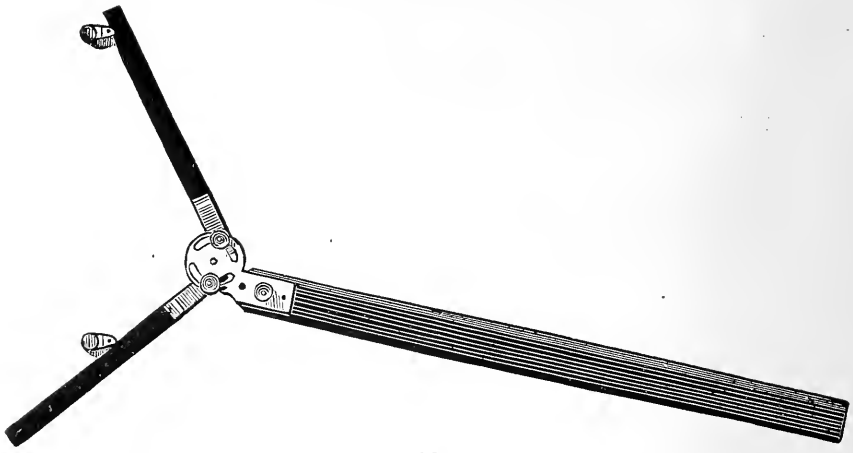
715. Bronze Heads, Steel Blade, with Protractor Head, graduated to half degrees, blade 36 inches long, ... $16.00

716.

716. Brass Swivel for T Square, with nut and washer, ...60

717. Same as 716, but of German silver, ...85

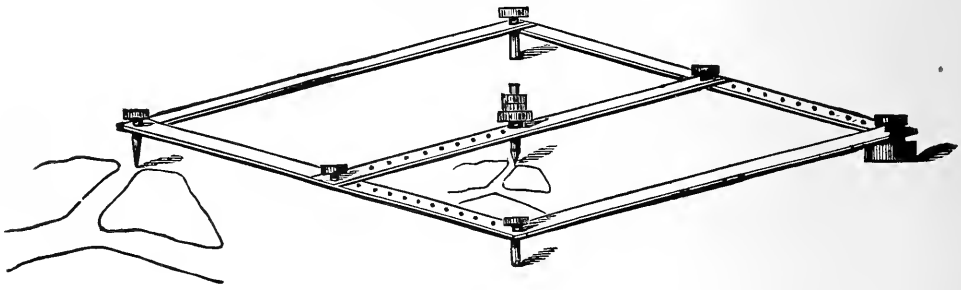
CENTROLINEAD.



733.

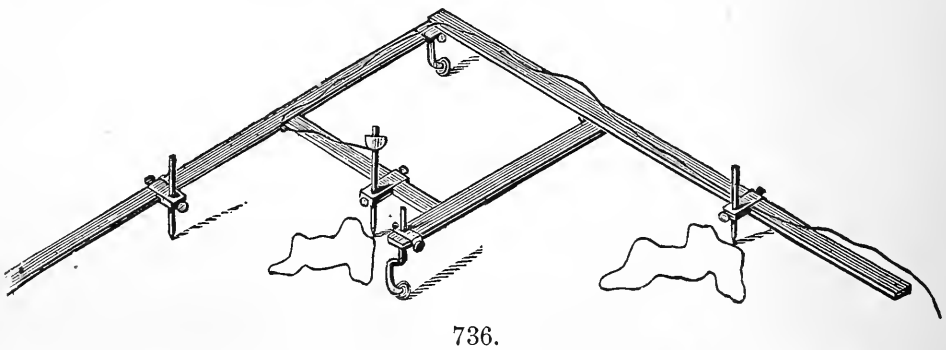
No.		Price.
733.	Centrolinead, of wood, for perspective drawing, arms 24 inches, . .	$5.00
733½.	Do. do. do. do. do. 36 do. . .	6.50

PANTOGRAPHS.



734.

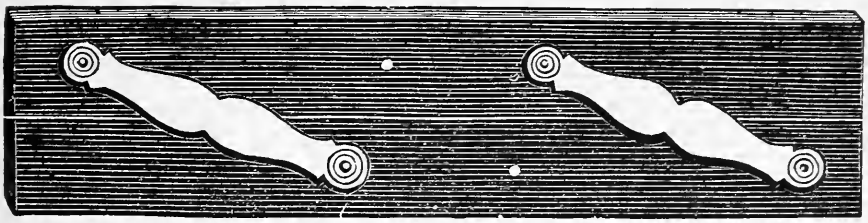
734.	Pantograph of hardwood arms, ...	3.00
735.	Do. pearwood, arms 22 inches long, ...	5.50



736.

736.	Pantograph of black wood, with Brass Joints and Mountings, Iron and Lead Weights and complete Fittings, of good comstruction, for fine work, arms 20 inches long, in case, each, ...	18.00
737.	Pantrograph of ebony, in box, arms 24 inches long, ...	25.00
738.	Do. brass, do. 24 do. . . .	60.00
739.	Do. do. do. 30 do. . . .	70.00

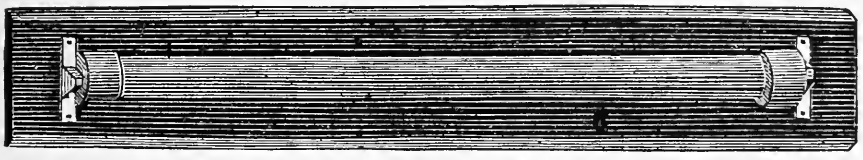
PARALLEL RULERS.



750.

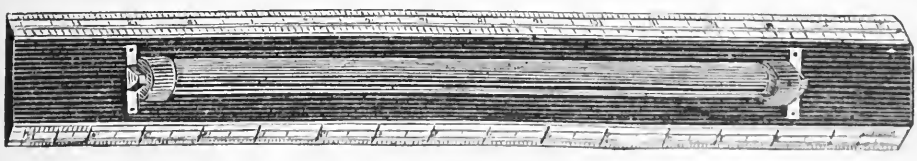
No.								Price.
750.	Parallel Rulers, ebony, brass mounted,			6	inches	long, each,	. .	$0.25
751.	Do.	do.	do.	9	do.	do.	. .	.50
752.	Do.	do.	do.	12	do.	do.	. .	.75
753.	Do.	do.	do.	15	do.	do.	. .	1.00
754.	Do.	do.	do.	18	do.	do.	. .	1.25
755.	Do.	do.	do.	24	do.	do.	. .	2.00
756.	Do.	German silver mounted,		12	inches	long, each,	. .	1.25

ROLLING PARALLEL RULERS.



759.

759.	Parallel Ruler, all German silver, on rollers,			12	inches	long, . .	10.00
760.	Do.		do.	do.	15	do. . .	12.00
761.	Do.		do.	do.	18	do. . .	15.00
762.	Do.	all brass, on rollers,		9	inches	long, ...	6.50
763.	Do.	do.	do.	12	do.	. . . .	8.00
764.	Do.	do.	do.	15	do.	. . . .	10.00
764½.	Do.	do.	do.	18	do.	. . . .	12.00
765.	Do.	ebony,	do.	12	do.	. . . .	3.25
766.	Do.	do.	do.	15	do.	. . . .	4.00
767.	Do.	do.	do.	18	do.	. . . .	5.00



768.

768.	Parallel Ruler, ebony, ivory graduated edges, on rollers,			12	inches	long,	5.00
769.	Do.	do.	do.	do.	15	do.	6.50
770.	Do.	do.	do.	do.	18	do.	7.50

DRAWING PAPERS IN SHEETS.

No. PRICE.

800. **WHATMAN'S HOT AND COLD-PRESSED DRAWING PAPERS, SELECTED.**

Whatman's Papers, hot-pressed, have smooth surfaces; cold-pressed have fine grain surfaces. In ordering, customers will please state which surface they desire.

We import and sell only the best quality of Whatman's hand-made papers.

Demy,	20x15 inches,	per quire,	$1.00,	.	per sheet,	$0.06
Medium,	22x17 do.	do.	1.40,	.	do.	.08
Royal,	24x19 do.	do.	1.75,	.	do.	.10
Super-royal,	27x19 do.	do.	2.20,	.	do.	.12
Imperial,	30x21 do.	do.	3.00,	.	do.	.20
Atlas,	33x26 do.	do.	4.50,	.	do.	.25
Double Elephant,	40x26 do.	do.	5.50,	.	do.	.30
Antiquarian,	52x31 do.	do.	30.00,	.	do.	1.50

800 B. **WHATMAN'S DRAWING PAPER, EXTRA WEIGHT.**

Imperial, . .	per quire,	$9.00,	. . .	per sheet,	.45
Double Elephant, .	do.	14.00,	. . .	do.	.75

801. **MACHINE PAPERS, SUITABLE FOR PENCIL DRAWINGS.**

Demy, 20x15 inches, .	per quire,	$0.60,	. .	per sheet,	.04
Medium, . . .	do.	.75,	. .	do.	.05
Royal, . . .	do.	1.00,	. .	do.	.06
Super-royal, . . .	do.	1.25,	. .	do.	.08
Imperial, . . .	do.	1.50,	. .	do.	.10
Double Elephant, . .	do.	2.50,	. .	do.	.20

DETAIL PAPERS.

		Per lb.	Per Roll of 10 Yards.	Per Yard.
"Bon Accord,"	36 inches wide, thin, .	$0.18	$0.75	$0.12
Do	42 do do .	.18	1.00	.15
Do	36 do medium, .	.18	1.00	.15
Do	42 do do .	.18	1.25	.18
Do	54 do do .	.18	1.50	.20
Do	36 do heavy .	.18	1.25	.18
Do	42 do do .	.18	1.50	.20
Do	54 do do .	.18	2.00	.25
Doppelt Detail Paper,	36 inches wide, .	.25	1.50	.18
Do do	42 do .	.25	1.80	.20
Do do	54 do .	.25	2.50	.30

801 A.

GREY. DRAWING PAPER FOR DETAILS, VERY SUPERIOR.

57 inches wide, per pound, $0.45 . . . . per yard .35

The pound price applies only to full rolls.

No. DRAWING PAPERS CONTINUOUS.

In Rolls of 30 to 40 Pounds.

802	Per lb.	Per Roll of 10 Yards.	PRICE. Per Yard.
Papier Pourtout, 36 inches wide,	$0.35	$1.80	$0.20
Do do 42 do	.35	2.35	.25
Do do 54 do	.35	3.00	.35
Constantia, 36 inches wide,	.45	2.25	.25
I. X. L., 42 inches wide, medium,	.45	3 00	.35
Do 58 do do	.45	5.00	.60
Acme, 36 inches wide, medium,	.45	2.25	.25
Do 42 do do	.45	3.00	.35
Do 58 do do	.45	4 00	.45
Do 58 do heavy,	.45	5.00	.60
Leonine, 62 inches wide, medium,	.45	3.75	.40
Do 62 do heavy	.45	4.50	.50

MOUNTED DRAWING PAPERS.

WHITE, CONTINUOUS IN ROLLS.

803	Per Roll of 10 Yards.	PRICE. Per Yard.
Mounted Papier Pourtout, 36 inches wide,	$7.50	$0.85
Do do do 42 do	8 50	.95
Do do do 54 do	10.75	1.20
Mounted Constantia, 36 inches, medium,	8.50	.90
Mounted Acme, 36 do	8.50	.90
Do do 42 do	9.50	1.10
Do do 54 do	12.00	1.35
Do do 54 inches heavy,	12.50	1.40
Do do 58 do medium,	12.50	1.40
Do do 58 do heavy,	13.50	1.60
Mounted I. X. L., 42 inches smooth,	9.00	1.10
Do do 42 do rough,	9 00	1.10
Do do 54 do smooth,	12.50	1.35
Do do 54 do rough,	12.50	1.35
Do do 58 do smooth,	13.50	1.60
Do do 58 do rough,	13.50	1.60
Mounted Leonine, 62 inches wide, thin,	13.00	1.55
Do do 62 do heavy,	13.50	1.60

MOUNTED PAPER IN SHEETS.

804

Mounted Whatman's Papers.

Royal,	selected,	18x24 inches,	per sheet,	.40
Imperial,	do	22x30 do	do	.50
Double Elephant,	do	27x40 do	do	.75
Antiquarian,	do	31x33 do	do	1.80

Large sheets of Paper for Maps mounted to order.

No.		Price.
804½.	Architects' Manilla Sketching Paper, 31x50, per quire, $7.50; per sheet, This paper is an entirely new article, needs no stretching, will not buckle, and is especially recommended.	$0.40

ROLL DRAWING PAPERS FOR SENSITIZING.

42 inches wide, per roll of 55 yards,	8.50
60 do. do. do.	12.00
Steinbach's, 53 inches wide, very superior, light, per yard,	.35
Do. do. do. heavy, do.	.50

805. TRACING OR VELLUM CLOTH.

In Rolls of 24 yards, both sides glazed, or face glazed and back dull, suitable for pencil marks.

Imperial,	18	inches wide, per roll, $5.00;	per yard,	.25
Do.	30	do. do. 6.90;	do.	.40
Do.	36	do. do. 7.60;	do.	.45
Do.	42	do. do. 10.50;	do.	.60
Sagar's Patent,	18	do. do. 4.10;	do.	.25
Do.	30	do. do. 7.40;	do.	.40
Do.	36	do. do. 8.10;	do.	.45
Do.	42	do. do. 11.50;	do.	.60

TRACING PAPERS IN SHEETS.

806.	French, in Sheets.	Royal, 19x25 inches,	per quire, 1.00
807.	Do. do.	Super-royal, 21x26 inches,	do. 1.50
808.	Do. do.	Double Elephant, 28x40 inches,	do. 2.50
811.	Do.	Vegetable Royal, 19x25 inches, per quire, $2.20;	per sheet, .12
812.	Do.	do. Super-royal, 21x26 inches, do. 3.50;	do. .40
813.	Do.	do. Double Elephant, 28x40 do. do. 10.00;	do. .50
815.	English, in Sheets,	20x30 inches, do. 1.50;	do. .10
815½.	Do. do.	40x30 do. do. 3.00;	do. .15
816.	Do.	finest quality, in sheets, 20x30 in., do. 2.50;	do. .15
816½.	Do.	do. do. 40x30 do. do. 5.00;	do. .25

TRACING PAPERS IN ROLLS.

816¾A.	English, in rolls of 20 yards, 40 inches wide, per roll,	4.00
B.	French, common, in rolls of 11 yards, 43 inches wide, per roll,	1.50
C.	Do. do. do. 22 do. 43 do. do.	2.50
D.	Do. vegetable, do. 22 do. 54 do. do.	5.00
E.	Parchment, very tough and transparent, and does not discolor from age, in rolls of 33 yards, 38 inches wide, per roll,	8.00
F.	German, not prepared, in rolls of 33 yards, 54 inches wide, per roll,	5.00
G.	German, thin, tough, and transparent, in rolls, 43 do. 22 yards long, per roll,	4.50
H.	Same as G, but extra stout and heavy,	5.00

REYNOLD'S BRISTOL BOARD.

			2 Sheets.	3 Sheets.	4 Sheets.
12¾x16¼	inches	Cap, per dozen,	$0.70	$1.10	$1.40
14¼x18½	do.	Demy, do.	1.10	1.50	1.80
16½x20¾	do.	Medium, do.	1.40	1.80	2.50
18 x22½	do.	Royal, do.	2.00	2.75	3.50

Bond-paper, for tracings, very tough.

	16x21	16x24	19x24	19x30 inches.
per 100 sheets,	$3.25	3.75	4.00	5.00

English Parchment.

16x20	18x20	18x22	18x24	20x24 inches.
per dozen, $5.25	6.00	7.00	7.25	7.50

Gelatine or Glass-paper,

	13x19	17x21 inches.
per dozen,	$3.50	4.00

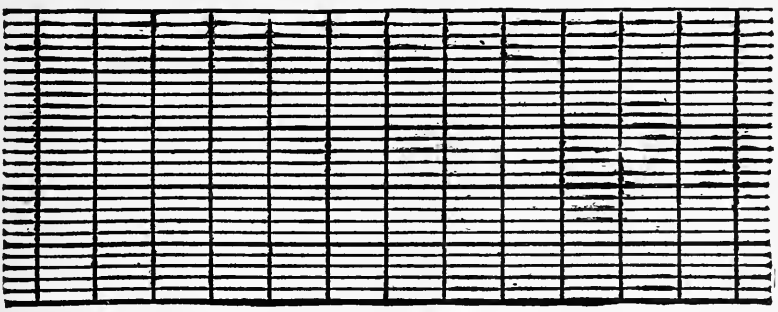
Transfer Paper, blue, red, and black, 18½x23 inches, Royal, per dozen, $2.50
White Mounting Board, 22x28 inches, according to thickness, per sheet, .15 to .25

PROFILE PAPERS.

Printed in red or green.

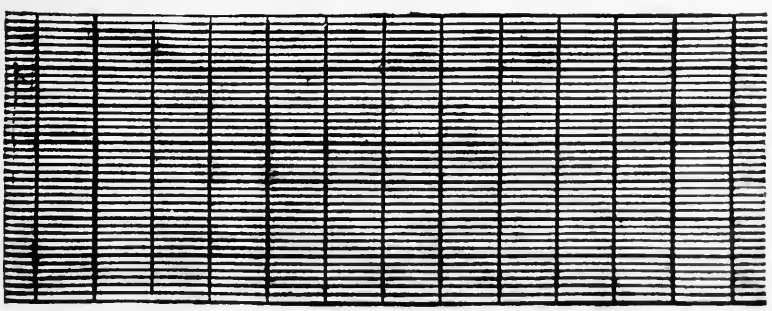
After a long series of experiments, we are now prepared to furnish in sheets, and in continuous rolls, a perfect article of Profile Paper. Our plates, A and B, are so well known amongst engineers, and have met with such universal approval, that a detailed description of the rulings seems unnecessary.

We have recently added another plate with metric divisions, which, we trust, will meet the wants of the engineering profession desiring to use this scale.



PROFILE PAPER, PLATE A.

No.		PRICE.
820.	In Sheets, Rulings 42 inches long by 15 inches wide; Horizontal Divisions, four to the inch; Vertical Divisions, twenty to the inch, and having every tenth horizontal division line and every fiftieth vertical division line heavier than the others. Price, per quire, $8.50; per sheet, ...	$0.40
1.	In Sheets, 42x6½ inches, per quire, $6.50; per sheet, ...	.30
2.	In Continuous Rolls, Rulings 20 inches wide, per yard, ...	.30
3.	Muslin Backed, Rulings 20 inches wide, in rolls of 20 yards, per yard,	.75
4.	Printed on Tracing Cloth, Rulings 42x15 inches, per sheet, . .	1.00

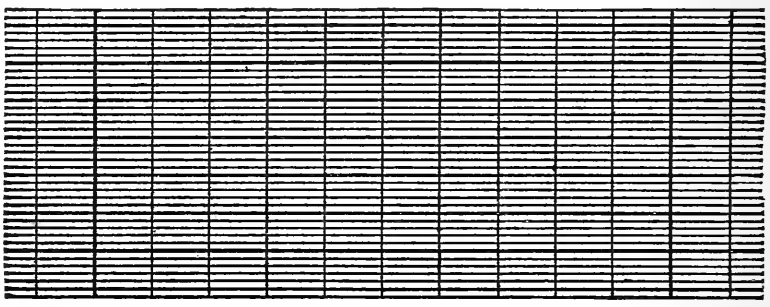


PROFILE PAPER, PLATE B.

No. PRICE.

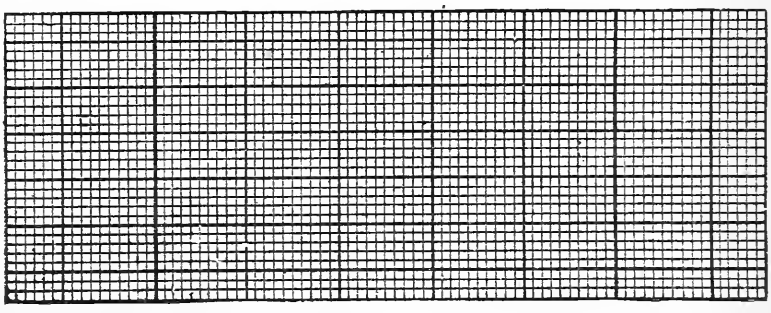
822. Horizontal Divisions, four to the inch; Vertical Divisions, thirty to the inch, and having every fourth horizontal division line and every twenty-fifth vertical division line heavier than the others.

1. Plate B.—In Sheets, Rulings 14 inches long by 13 inches wide, per quire, $8.50; . . . . . per sheet, .40
2. Plate B.—In Sheets, Rulings 42x6½ inches, per quire, $6.50; per sheet, .30
3. Plate B.—In Continuous Roll, Rulings 20 inches wide, per yard, . .30
4. Plate B.—In Continuous Roll, Rulings 9 inches wide, per yard, . .20
5. Plate B.—Muslin Backed, Rulings 20 inches wide, in rolls of 20 yards, per yard, ...75
6. Plate B.—Muslin Backed, Rulings 9 inches wide, in rolls of 20 yards, per yard, ...50
7. Plate B.—Printed on Tracing Cloth, Rulings 42x15 inches, per sheet, 1.00



PROFILE PAPER, PLATE C.

824. Horizontal Divisions, five to the inch; Vertical Divisions, twenty-five to the inch, and having every fifth horizontal division line and every twenty-fifth vertical division line heavier than the others; in Sheets, Rulings 42 inches long by 15 inches wide, per quire, $8.50; per sheet, ...40



PROFILE PAPER, METRIC.

Metric.—In Continuous Roll, Rulings 50 centimetres wide, in millimetres, with each fifth millimetre, each centimetre, and each decimetre proportionally heavier than the millimetres. Price, per yard, . . .30

Metric.—Muslin Backed, Rulings 20 inches wide, in rolls of 20 yards, per yard, ...75

CROSS SECTION PAPERS.

Printed in red or green.

No. PRICE.

830. Topographical Paper, 14x17 inches, ruled 400 feet to the inch, per quire, $1.75; per sheet, ... $0.10

831. Trautwine's Cross Section and Diagram, 10 feet to inch, for embankments of 14 and 24 feet, roadway, and for excavations of 18 and 28 feet, rulings 19¾x12 inches, per quire, $5.00; per sheet, ...25

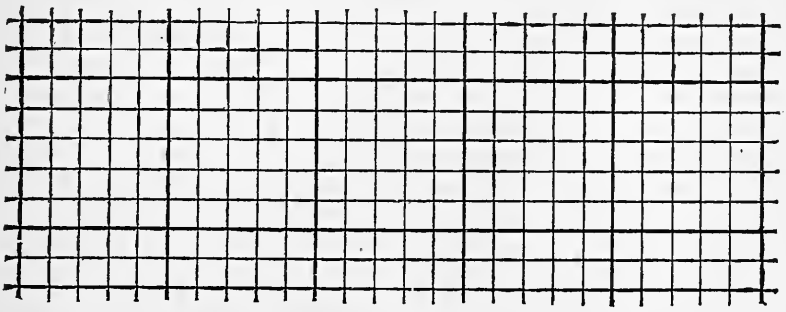


PLATE C.

832. Cross Section Paper, Plate C, rulings 20x16 inches, 8 feet to inch, per quire, $5.00; per sheet, ...25

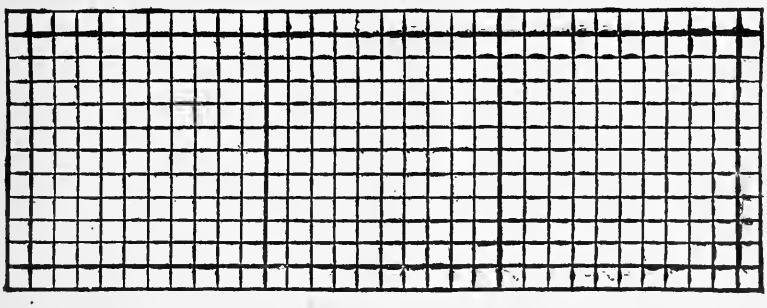


PLATE F.

833. Cross Section Paper, Plate F, rulings 20x16 inches, 10 feet to inch, per quire, $5.00; per sheet, ...25

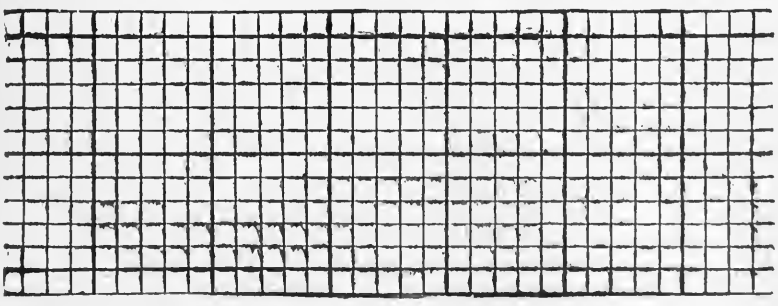


PLATE G.

834. Cross Section Paper, Plate G, rulings 22x16 inches, 10 feet to inch, every fifth line heavy, per quire, $5.00; per sheet, ...25

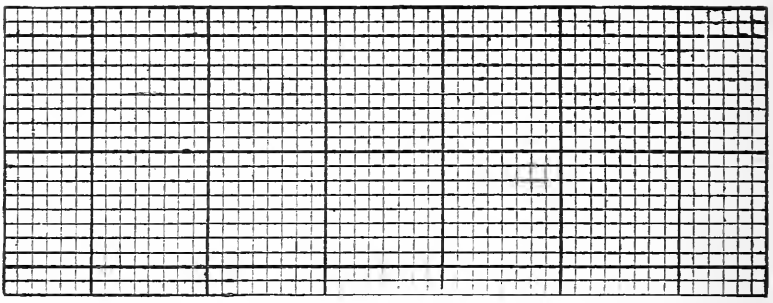
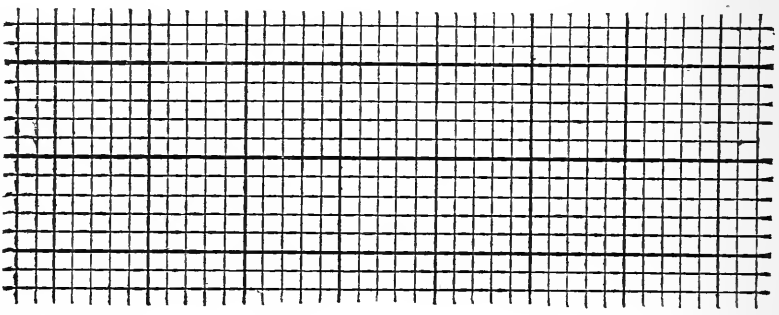


PLATE H.

No.		Price.
835.	Cross Section Paper, Plate H, rulings 21x16 inches, 16 feet to inch, per quire, $5.00; per sheet,	$0.25



835½.	Cross Section Paper, Metric, rulings every two millimetres, size of sheet, 40x50 centimetres, per quire, $5.00; per sheet,	.25
835¾.	Cross Section, Plate G, printed on Parchment Tracing Paper, in sheets, 18x20 inches, per quire, $5.00; per sheet,	.25

The following list of Cross Section Papers, being ruled, are much cheaper than those printed from copper plates, and are sufficiently accurate for sketching or designing purposes.

Ruled Cross Section Paper, 4 spaces to inch, 20x28 inches, per quire,	2.50
Do. do. do. 8 do. 20x28 do. do.	2 50
Do. do. do. 10 do. 20x28 do. do.	2.50
Do. do. do. 10 do. 20x28 do. 5 to block, per quire,	2.50
Ruled Cross Section Paper, 12 spaces to inch, 20x28 inches, per quire,	2.50

SKETCHING OR DESIGNING PADS.

Sketching Pads, plain block, 5x7 inches, 25 leaves, rulings either 4, 8, 10, or 12 spaces to inch,	1.25
Sketching Pads, plain block, 10x14 inches, 25 leaves, rulings either 4, 8, 10, or 12 spaces to inch,	2.50

TOWNSHIP PLOTTING PAPER.

No.		Price
839½.	Township Plotting Paper, Rulings 6x6 blocks, blocks 1 inch square, per 100 sheets,	$2.00
	Township Plotting Paper, Rulings 12x12 blocks, blocks 2 inches square, per 100 sheets,	2.50

WEAVERS' DESIGN PAPERS.

No.		Price.
836.	1. Design Paper, Rulings 4x4 to block, block 1 inch square, per quire, $3.00; . . . . . per sheet,	.15
	2. Design Paper, Rulings 5x5 to block, block ½ inch square, per quire, $3.00; . . . . . per sheet,	.15
	3. Design Paper, Rulings 5x5 to block, block ⅝ of an inch square, per quire, $3.00; . . . . . per sheet,	.15
	4. Design Paper, Rulings 5x5 to block, block ⅞ of an inch square, per quire, $3.00; . . . . . per sheet,	.15
	5. Design Paper, Rulings 6x8 to block, per quire, $3.00; . per sheet,	.15
	6. Design Paper, Rulings 8x8 to block, block $\frac{7}{16}$ of an inch square, per quire, $3.00; . . . . . per sheet,	.15
	7. Design Paper, Rulings 8x8 to block, block $\frac{1}{1^3}$ of an inch square, per quire, $3.00; . . . . . per sheet,	.15
	8. Design Paper, Rulings 8x8 to block, block 1 inch square, per quire, $3.00; . . . . . per sheet,	.15
	9. Design Paper, Rulings 8x16 to block, block ⅝ of an inch square, per quire, $3.00; . . . . . per sheet,	.15
	10. Design Paper, Rulings 10x10 to block, block 1 inch square, per quire, $3.00; . . . . . per sheet,	.15
	11. Design Paper, Rulings 12x12 to block, block $\frac{9}{16}$ of an inch square, per quire, $5.00; . . . . . per sheet,	.25
	12. Design Paper, Rulings 12x12 to block, block 1 inch square, per quire, $5.00; . . . . . per sheet,	.25
	13. Design Paper, Rulings 8x10 to block, per quire, $5.00; . per sheet,	.25
	14. Design Paper, Rulings 8x12 to block, per quire, $5.00; . per sheet.	.25
	15. Design Paper, Rulings 15x15 to block, block 1 inch square, per quire, $3.00; . . . . . per sheet,	.25
	16. Design Paper, Rulings 8x9 to block, block $\frac{7}{16}$ of an inch square, per quire, $3.00; . . . . . per sheet,	.15
839.	Patent Office Blanks, per dozen, $1.00; , , , , . per sheet,	.10

LYONS' TABLES.

840. Lyons' Tables. A set of Tables for finding at a glance the true cubical contents of Excavation and Embankments for all Bases, and for every variety of Ground and Side Slopes. By M. E. Lyons, C. E.

Sheet No.	1.	General Table for all Bases and all Slopes.		
Do.	2.	For Side Hill Cuts and Fills.		
Do.	3.	Base 12 feet	Slopes, ...	1½ to 1
Do.	4.	do. 14	do.	1½ to 1
Do.	5.	do. 15	do.	¼ to 1
Do.	6.	do. 15	do.	1 to 1
Do.	7.	do. 15	do.	1½ to 1
Do.	8.	do. 16	do.	¼ to 1
Do.	9.	do. 16	do.	1 to 1
Do.	10.	do. 18	do.	¼ to 1
Do.	11.	do. 18	do.	¾ to 1
Do.	12.	do. 18	do.	1 to 1
Do.	13.	do. 18	do.	1½ to 1
Do.	14.	do. 20	do.	1½ to 1
Do.	15.	do. 24	do.	¼ to 1
Do.	16.	do. 24	do.	1½ to 1
Do.	17.	do. 25	do.	1½ to 1
Do.	18.	do. 26	do.	1½ to 1
Do.	19.	do. 28	do.	¼ to 1
Do.	20.	do. 30	do.	1 to 1
Do.	21.	do. 30	do.	1¼ to 1
Do.	22.	do. 30	do.	1½ to 1
Do.	23.	do. 32	do.	1 to 1
Do.	24.	do. 32	do.	1½ to 1

BLUE PROCESS PAPER.

For this process our papers are specially made of the best and purest stock, so that they can be thoroughly relied upon. We furnish them of various sizes, and either prepared or unprepared. They have become so familiar to users that it is hardly necessary to describe their uses.

UNPREPARED BLUE PROCESS PAPERS.

No.

840 A.—G. S. W.—THIN, IN ROLLS OF 50 YARDS EACH.

30 in.,	per roll,	$4.00,	when cut,	per yard,	$.010
36 do.	do.	4.75,	do.	do.	.12
40 do.	do.	5.25,	do.	do.	.15

840 B.—G. S. W.—THICK, IN ROLLS OF 50 YARDS EACH.

30 in.,	per roll,	$6.00,	cut to size,	per yard,	$0.12
36 do.	do.	7.00,	do.	do.	.15
40 do.	do.	8.00,	do.	do.	.18

840 C.—ACME HELIO.—IN ROLLS OF 50 YARDS EACH.

27 in.,	$5.50
36 do.	6.50
42 do.	8.50
54 do.	10.50

PREPARED BLUE PROCESS PAPERS.

These are carefully coated, upon receipt of orders, so that customers can absolutely rely upon receiving fresh and sensitive paper. Are carefully wrapped in such manner as to exclude all light and moisture.

No.

840 D.—G. S. W.—THIN, IN ROLLS OF 10 YARDS.

30 in.,	per roll,	$2.50
36 do.	do.	3.25
40 do.	do.	4.50

840 E.—G. S. W.—THICK, IN ROLLS OF 10 YARDS.

30 in.,	per roll,	$3.00
36 do.	do.	3 75
40 do.	do.	5.00

840 F.—ACME HELIO.—IN ROLLS OF 10 YARDS EACH.

30 in.,	per roll,	$2.30
36 do.	do.	2.75
42 do.	do.	3.60

Blue Prints, made to order from tracings, cost, according to size of tracing, at 10 cents per square foot.

White Prints (blue lines on white back-ground), so that colors can be added to prints made to order, according to size of tracing, 12 cents per square foot. For this purpose draughtsmen should be careful that lines of tracing are clean and black. Higgins' American Drawing Ink, "General," is the best ink for this purpose.

THE BLUE PROCESS OF COPYING TRACINGS.

Special attention has recently been directed to this easy process of copying tracings, and its great value to all Engineers, Architects, and Mechanical Draughtsmen fully recognized.

The instructions in using are—

1. Provide a flat board as large as the tracing which is to be copied.
2. Lay on this board two or three thicknesses of common blanket or its equivalent, to give a slightly yielding backing for the paper.
3. Lay on the blanket the prepared paper with the sensitive side uppermost.
4. Lay on this paper the tracing, smoothing it out as perfectly as possible, so as to insure a perfect contact with the paper.
5. Lay on the tracing a plate of clear glass, which should be heavy enough to press the tracing close down upon the paper. Ordinary plate-glass of three-eighths thickness is quite sufficient.
6. Expose the whole to a clear sunlight by pushing it out on a shelf from a window, or in any other convenient way, from four to six minutes [in winter, six to ten minutes]. If a clear sky only can be had, the exposure must be continued from twenty to thirty minutes, and under a cloudy sky from sixty to ninety minutes may be needed, the shade depending on the time.
7. Remove the prepared paper and wash it freely for one or two minutes in clear water, and hang it by one corner to dry.

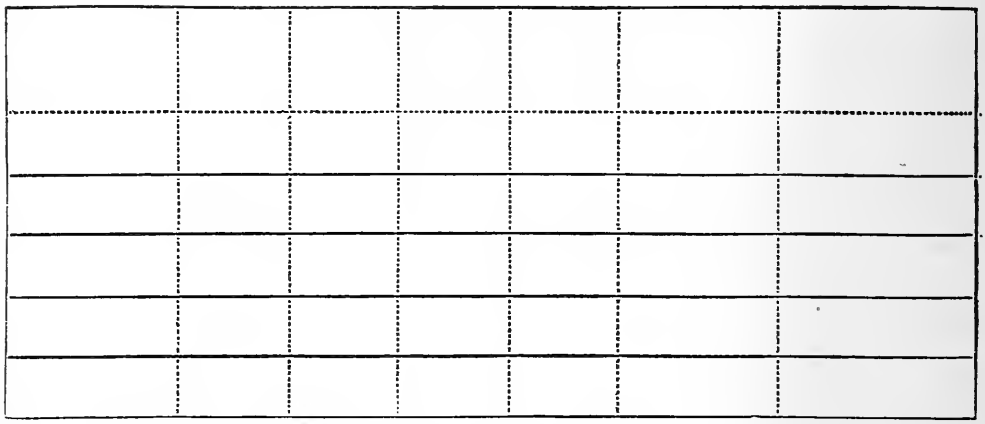
PREPARED BLUE PROCESS PAPERS IN SHEETS.

Are packed in tubes to keep from light, one dozen sheets in each tube, and are always ready for immediate use.

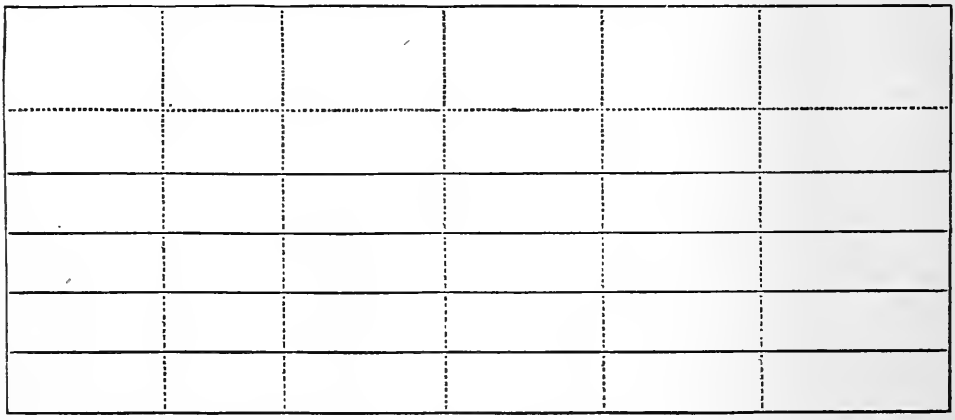
		PRICE.
Demy, 16x21,	per dozen,	$0.75
Medium, 18x23,	do.	1.00
Royal, 19x24,	do.	1.10
Double Medium, 23x36,	do.	2.10
Double Elephant, 27x40,	do.	3.00
Photo-solution, per bottle,		4.40

ENGINEERS'

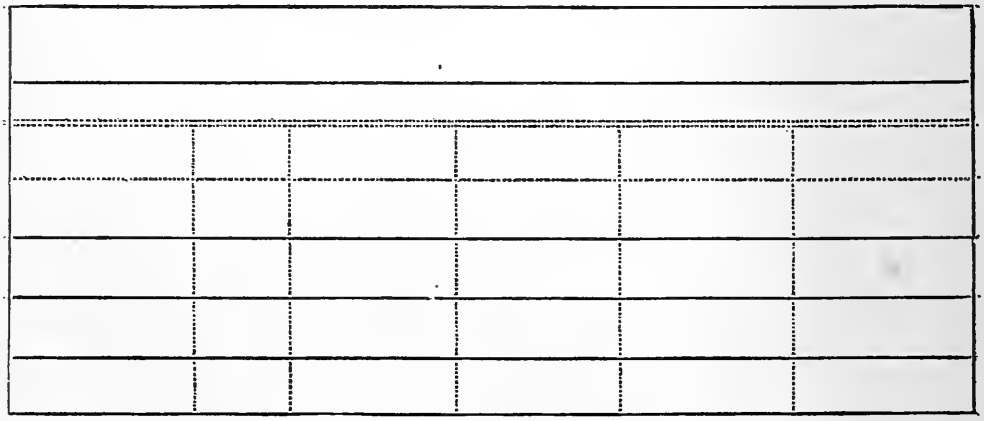
The Solid Lines are Ruled in Black,



841. Level Book, 7 x4 inches, made of superior drawing paper, per dozen, . .
841½. Do. do. 7 x4 do. same as 841, but interleaved with blotting paper, per
842. Do. do. 6½x4 do. extra smooth paper, per dozen, ...
842½. Profile Level Books, 7x4 inches, Level Ruling on one page, Profile Ruling on



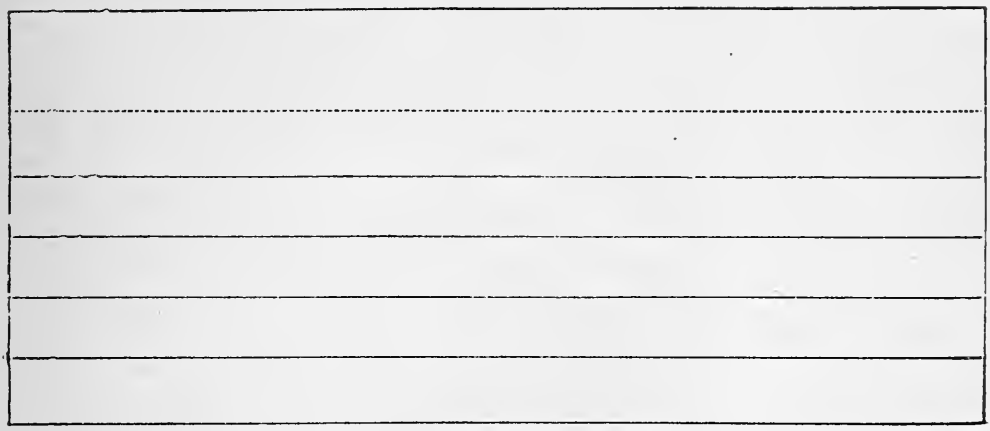
843. Transit Books, 7x4 inches, made of superior drawing paper, per dozen, . .
843½. Do. do. same as 843, but interleaved with blotting paper, per dozen, .
844. Do. do. 6½x4 inches, extra smooth paper, per dozen, ...



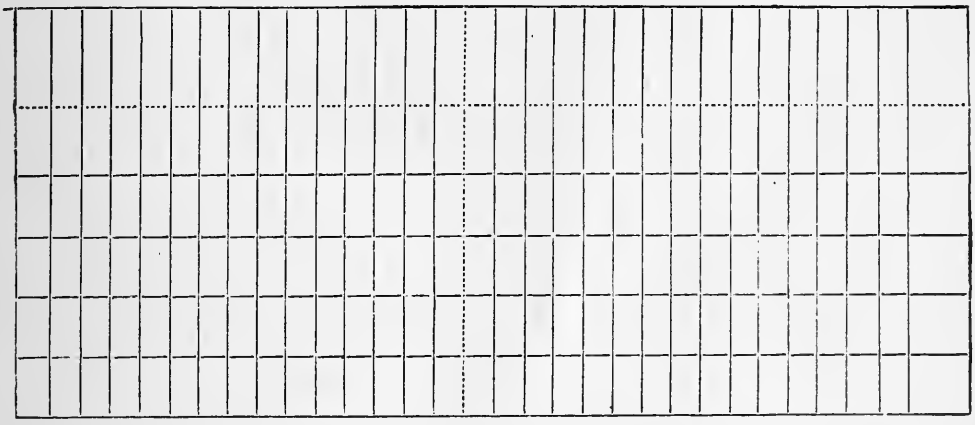
845. Record Books, 7½x5 inches, made of superior paper, per dozen, . . .

FIELD BOOKS.

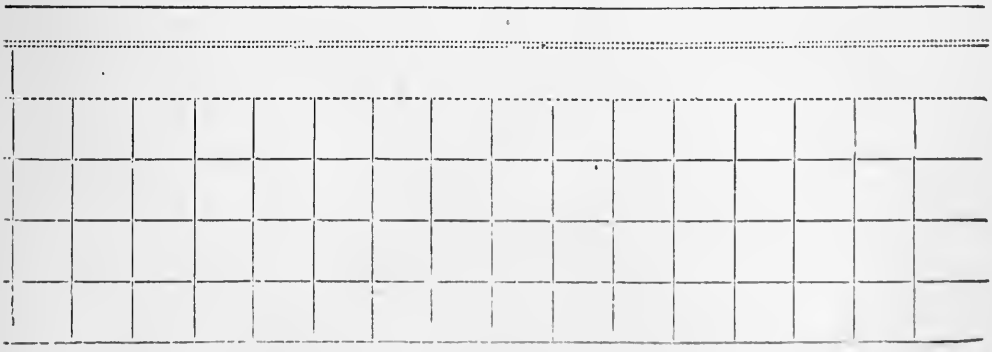
the Broken Lines in Red.



. . . . . $6.00
dozen, ... 6.50
. . . . . 4.50
the other, made of superior drawing paper, per dozen, ... 7.50



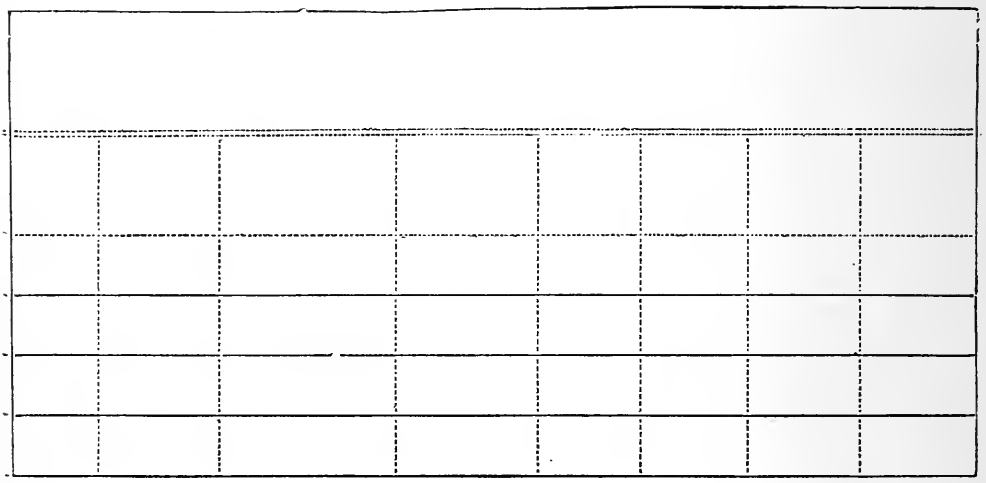
. . . . . 6.00
. . . . . 6.50
. . . . . 4.50



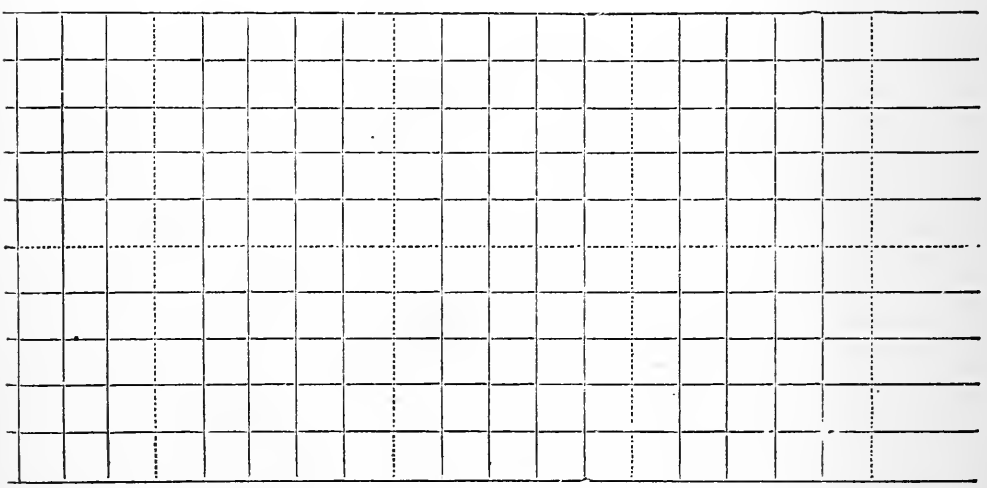
. . . . . 9.00

ENGINEERS'

The Solid Lines are Ruled in Black



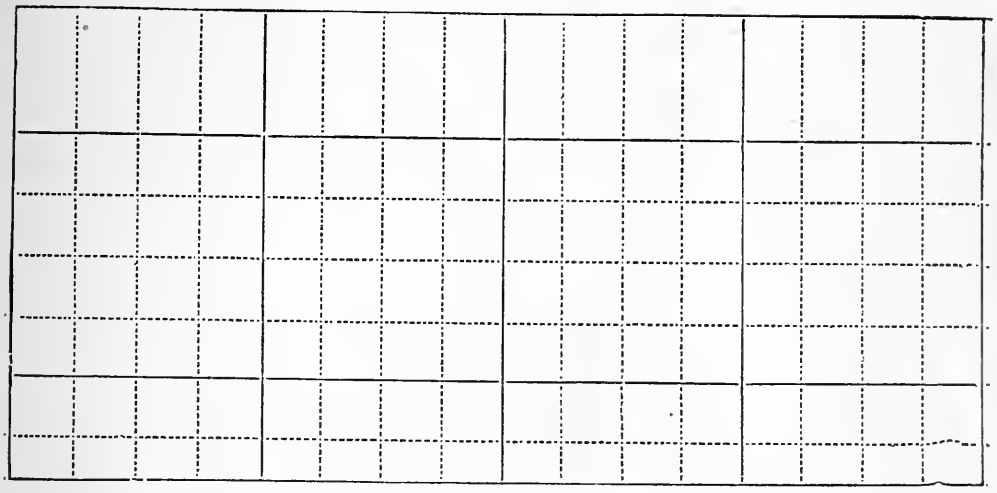
845½. Topographical Books, 8x5½ inches, made of superior paper, per dozen, .



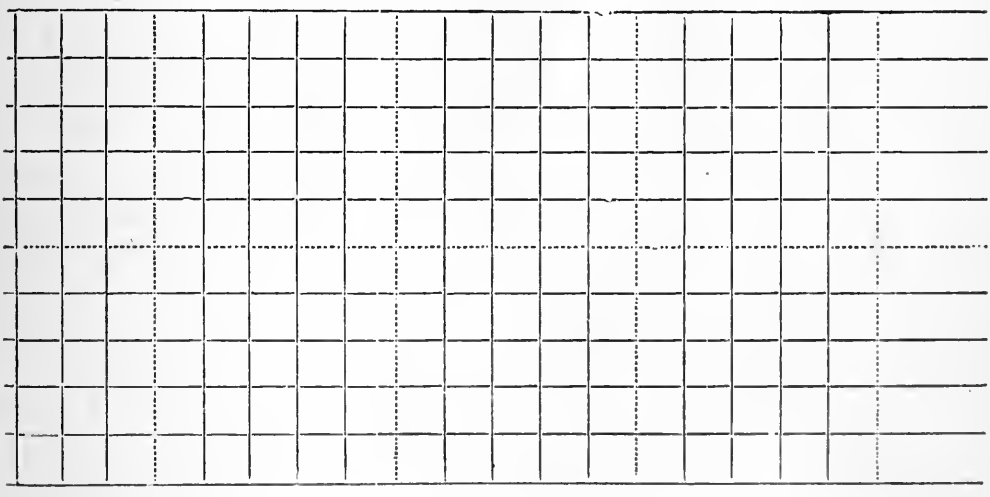
846. Cross-section Book, 8x7 inches, both pages ruled alike. in five divisions to inch
846 A. Do. do. 8x7 do. do. do. in four do. do.
846 B. Do. do. 8x7 do. do. do. in ten do. do.
846 C. Do. do. same ruling as B, but 7x4 inches, per dozen, . . .
846 D. Do. do. 8x7 inches, metric, both pages ruled alike, in squares of five
846 D. Memorandum Books, 4x5½ inches, with faint lines only, per dozen, . .
846 E. Time Books, Weekly or Monthly Notes, 4x6½ inches, per dozen, . . .

FIELD BOOKS.

the Broken Lines in Red.



. . . . . $12.00



per dozen, ... 12.00
do. 12.00
do. 12.00
. . . . . 7.50
millimeters, per dozen, ... 12.00
. . . . . 6.00
. . . . . 4.50

BOUND PROFILE BOOKS.

These books are for field or office purposes, being printed on both sides, of a tough, thick paper, and bound in flexible covers convenient for the pocket. Each page will contain a profile of three thousand feet in length, so that each folio will contain an average section of a road as usually laid out for construction. Railroad and other engineers will find them very useful. Size of book, $9\frac{1}{2}$ by $5\frac{3}{4}$ inches. The rulings correspond to our large profile plates A and B.

No.						Price.
847.	Plate A,	25	leaves,	imitation Turkey morocco, with elastic band,	. .	$3.50
	Do.	50	do.	do. do. do.	. .	5.00
	Do.	100	do.	do. do. do.	. .	8.00
	Do.	50	do.	Turkey morocco, turned edges, with elastic band,	.	6.00
	Do.	100	do.	do. do. do	.	9.00
848.	Plate B,	25	do.	imitation Turkey morocco, with elastic band,	. .	3.50
	Do.	50	do.	do. do. do.	. .	5.00
	Do.	100	do.	do. do. do.	. .	8.00
	Do.	50	do.	Turkey morocco, turned edges, with elastic band,	.	6.00
	Do.	100	do.	do. do. do.	.	9.00

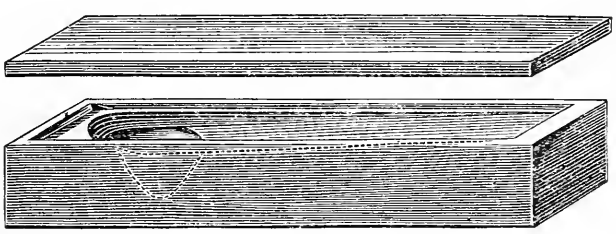
CONTINUOUS PROFILE BOOKS.

These are an improvement over No. 848, as described above, as they admit of the use of a continuous sheet for profile use. They are printed upon fine sheets of paper, and mounted upon a continuous piece of muslin and bound in book form.

848½.	Plate A,	8x5½ inches,	profile	12	miles,	bound in morocco, with band,	.	$3.00
	Do.	do.	do.	25	do.	do. do. do.	.	5.00
	Do.	do.	do.	50	do.	do. do. do.	.	8.50
	Do.	do.	do.	100	do.	do. do. do.	.	14.00
848¾.	Do. B,	8x4¾ inches,	do.	12	do.	do. do. do.	.	3.00
	Do.	do.	do.	25	do.	do. do. do.	.	5.00
	Do.	do.	do.	50	do.	do. do. do.	.	8.50
	Do.	do.	do.	100	do.	do. do. do.	.	14.00

Profile Books, either plate, bound in seal skin, with turned edges, $1.50 additional to the above prices. Special lengths made to order and bound as may be desired.

INK SLABS AND SAUCERS.



849.

						Price.
849.	Patent Ink Slab,	with cover,	$1\frac{3}{4}$x$4\frac{1}{2}$	inches, each,	. . . . .	.50
850.	Do.	do.	do.	$2\frac{1}{8}$x$5\frac{3}{4}$	do.	.60

WILLIAMS' INK SAUCER.

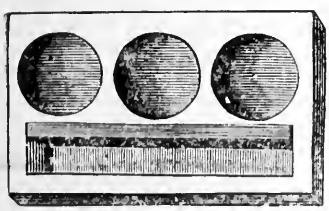
Various forms and sizes of China Nests and Slabs have long been in use for grinding or mixing India Ink and Water Colors, but none now in the market combine so many desirable qualities as the Cup shown in above cut. It consists of a saucer 3¼ inches in diameter, made of specially prepared milk-white glass, with cover; both are made with great care to prevent chipping or breakage, which avoids the objection to those having covers now in use. All edges of the cover and saucer which touch are ground, thus making it air-tight, and by preventing evaporation, preserves the ink as long as may be desired. The grinding surface is made either smooth or roughened, and is sunk sufficiently far below the lip as to prevent the annoyance of the ink splashing on the outside whilst being mixed. In the centre is a deep well, adapted to receive and contain the ground ink.

In short, we feel confident that when once introduced amongst draughtsmen it will meet with the large sale that its cheapness and excellence deserves.

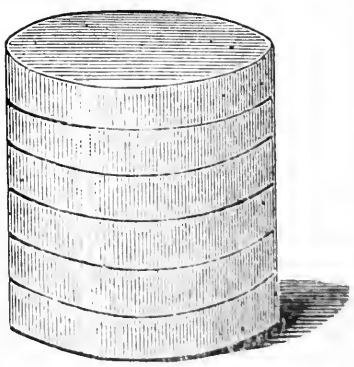
Price, either with smooth or roughened grinding surface, only 50 cents.

PORCELAIN SLABS.

For India Ink and Colors. Containing 3 holes or cups and 1 slanting division.



855.



859.

No.					Price.
855.	Measuring 2¾ by 1½	inches,	each,	. . . . .	$0.15
856.	Do. 3¾ by 2⅜	do.	do.	. . . . .	.25
857.	Do. 4⅜ by 2¾	do.	do.	. . . . .	.35
858.	Do. 4¾ by 3	do.	do.	. . . . .	.40

CABINET NESTS.

Porcelain Saucers in nests, fitted on each other.

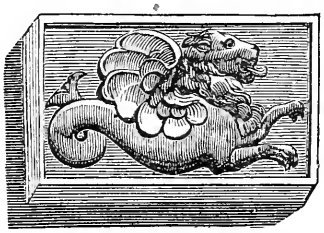
No.								Price
859.	Containing 5 Saucers and a Cover, $2\frac{1}{2}$ inches in diameter, per nest,							$0.60
860.	Do.	5	do.	do.	$2\frac{3}{4}$	do.	do.	.70
861.	Do.	5	do.	do.	$3\frac{1}{4}$	do.	do.	.80
$861\frac{1}{2}$.	Do.	5	do.	do.	$3\frac{3}{4}$	do.	do.	1.00
$861\frac{3}{4}$.	Architect's Basin, with 8 divisions and cup,							1.35

WATER GLASSES.

Plain, 2-inch diameter, $1\frac{3}{4}$ inches high, each, ...10
Finely cut, $2\frac{1}{2}$-inch diameter, $1\frac{1}{4}$ inches high, each, ... 30

WINSOR & NEWTON'S WATER COLORS.

HARD COLORS IN CAKES OR MOIST IN CHINA PANS.

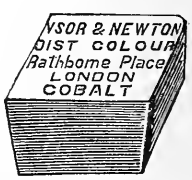


Whole Cake.

Half Cake.

Whole Pan.

862.



Half Pan.

862. Whole cakes or pan, 25 cents each; half cakes or pan, 15 cents each.

Antwerp Blue,	*Flake White,	Payne's Gray,
Bistre,	Gamboge,	Prussian Blue,
Blue Black,	Hooker's Green, No. 1,	Prussian Green,
*British Ink,	Hooker's Green, No. 2,	Raw Sienna,
Brown Ochre,	Indigo,	Raw Umber,
Brown Pink,	Indian Red,	Red Chalk,
*Bronze,	Italian Pink,	*Red Lead,
Burnt Sienna,	Ivory Black,	*Red Ochre,
Burnt Umber,	*King's Yellow,	Roman Ochre,
Chinese White,	Lamp Black,	Sap Green,
Chrome Yellow,	Light Red,	Terre Verte,
Cologne Earth,	Naples Yellow,	Vandyke Brown,
Deep Chrome,	Neutral Tint,	Venetian Red,
*Dragon's Blood,	New Blue,	Vermilion,
Emerald Green,	Olive Green,	Yellow Lake,
	Orange Chrome,	Yellow Ochre.

863. Whole cakes or pan, 45 cents each; half cakes or pan, 25 cents each.

*Black Lead,	Indian Yellow,	Reuben's Madder,
Brown Madder,	Mars Yellow,	Scarlet Lake,
*Chalon's Brown,	Neutral Orange,	Scarlet Vermilion,
*Constant White,	Purple Lake,	Sepia,
Crimson Lake,	Roman Sepia,	Warm Sepia.

864. Whole cakes or pan, 65 cents each; half cakes or pan, 35 cents each.

Cobalt Blue,	Orange Vermilion,	Violet Carmine.

865. Whole cakes or pan, 90 cents each; half cakes or pan, 45 cents each.

Aureolin,	French Blue,	Pale Cadmium Yellow,
Burnt Carmine,	Gallstone,	Pink Madder,
Cadmium Yellow,	Green Oxide of Cromium,	Pure Scarlet,
Cadmium Orange,	Indian Purple,	Rose Madder,
Carmine,	Intense Blue,	Viridian.
	Lemon Yellow,	

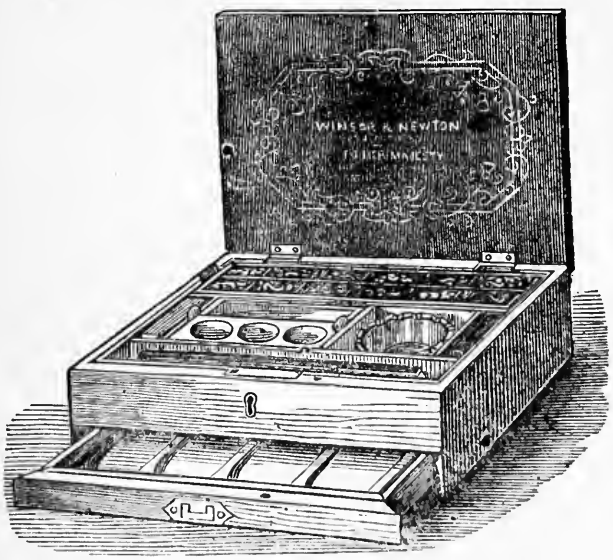
866. Whole cakes or pan, $1.40 each; half cakes or pan, 70 cents each.

*Field's Orange Vermilion,	Mars Orange,	Smalt,
*Madder Carmine,	Purple Madder,	Ultramarine Ash.

Genuine Ultramarine, ¼ cakes, each $2.25. Pure Gold, in cakes, $2.50; in cups, 25 cents; in shells, 20 cents.

Colors not made in pans are marked *.

WINSOR & NEWTON'S WATER COLOR BOXES, Complete.



867.

No.							Whole cakes. PRICE.	Half cakes. PRICE.
867—1.	Polished Mahogany Box, with lock and key and drawer, paint-stone, water-glass, India-ink, brushes, and 12 colors,						$12.00	
867—2.	Do.	do.	do.	do.	do.	18 do.	16.00	$12.00
867—3.	Do.	do.	do.	do.	do.	24 do.	20.00	15.00
868—1.	Polished Mahogany Box, with sliding lid and					12 do.	5.00	3.00
868—2.	Do.	do.	do.	do.		18 do.	7.50	4.25
869—1.	Empty Mahogany Color Boxes, for 12 colors,						.60	.50
869—2.	Do.	do.	do.	do.	18	do.	.75	.60
869—3.	Do.	do.	do.	do.	24	do.	1.00	.75

WINSOR & NEWTON'S WATER COLORS.

LIQUIDS, IN GLASS BOTTLES.

870—F.

No.		Price.
870—A.	Carmine,	$0.45
B.	Indelible Brown Ink,	.45
C.	Prout's Brown,	.45
D.	Gold Ink,	.65
E.	Extract of Ox Gall,	.35
F.	Indian Ink,	.35
G.	Chinese White,	.35
H.	Sepia,	.45
I.	Silver Ink,	.40
J.	Ox Gall, prepared in pots,	.20
K.	Pure Gold, in cakes,	2.00
L.	Do. in cups,	.25
M.	Do. in shells,	.20
N.	Silver Cakes, in cups,	.35
O.	Do. in shells,	.15

QUEEN & CO.'S STANDARD TECHNICAL WATER COLORS.

After many experiments, we have at last perfected a series of technical colors that we believe will meet a want long felt among draughtsmen for a ready-mixed standard color of fine grade, suitable for all branches of mechanical drawing.

The advantages we claim for these colors are:

1. All time usually spent in mixing the colors to proper shade is saved, and uniformity in tint is invariably produced.

2. The colors have been very carefully prepared, and are standard, such being universally used in all branches of mechanical drawing both in Europe and the United States.

3. They are made of the finest quality of water colors, and being put in moist form in pans, are always ready for use, and the liability to crumble of the cake colors is avoided.

The set described below contains the colors generally used by Architects, Machinists, Civil and Mechanical Engineers.

No.		Whole Pan. Each.	Half Pan. Each.	No.		Whole Pan. Each.	Half Pan. Each
1.	Copper,	$0.40	$0.25	9.	Lamp Black,	$0.25	$0.15
2.	Brass,	.40	.25	10.	Machinery Green,	.40	.25
3.	Steel,	.40	.25	11.	Vermilion,	.25	.15
4.	Wrought-iron,	.40	.25	12.	Leather,	.40	.25
5	Cast-iron,	.40	25	13.	Prussian Blue,	.25	.15
6.	Brick,	.40	.25	14.	Carmine,	1.15	.60
7.	Stone,	.40	.25	15.	Chinese White,	.25	.15
8.	Wood,	.40	.25				

Set complete in Japanned Tin Box, 15 full pans,	7.50
Do. do. do. half do.	5.00

LIST OF COLORS.

Universally used in all branches of mechanical draughting, both in Europe and the United States.

1. Copper.
2. Brass.
3. Steel.
4. Wrought-iron.
5. Cast-iron.
6. Brick.
7. Stone.
8. Wood.
9. Lamp Black.
10. Machinery Green.
11. Vermilion.
12. Leather.
13. Prussian Blue.
14. Carmine.
15. Chinese White.

Nos. 1 to 8 to be diluted as may be required for light and dark shadows on machinery, stone, brick, wood, etc.

No. 9 may also be used for ink lines, the same as India Ink.

No. 10 color used in painting machinery, to obviate both rust and cleaning.

NOTE.—All designed fractures or cross-sectional parts of steel, copper, wrought-iron, cast-iron, stone, brick, wood, etc., may be shown by a lighter or darker tint than that in which it is colored, or by consecutive parallel lines of same color.

"Standard Colors."

THEO. P. V. FAY,
Chief Draughtsman to the P. & R. R.

QUEEN'S COLORED INKS.

871. 872. 872½.

No.		Price.
871.	Liquid Blue, per bottle,	$0.25
	Do. Green, per bottle,	.25
	Do. Carmine, per bottle,	.50

These Inks are especially recommended, being the only good liquid blue and green colors now in the market. The blue, especially, is very superior, being very brilliant and permanent.

AMERICAN
DRAWING INK.

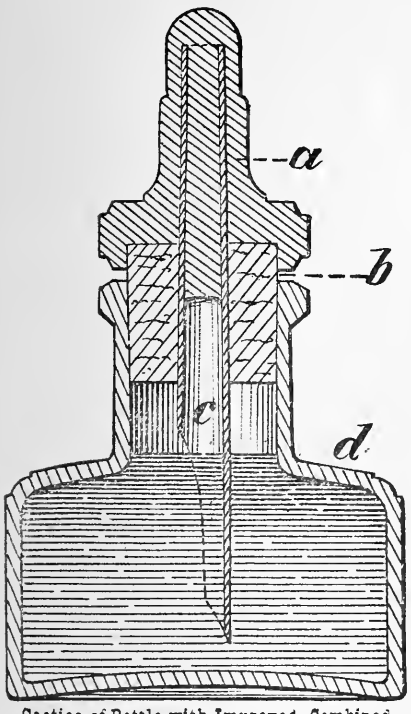
BOTTLE OF INK WITH STOPPER—(Full Size.)

No.		Price.
872.	No. 1.—General Drawing Ink, which is suitable for all general drawing whether lines or tints, or for pen or brush work. This quality is almost identical with the finer kinds of India Ink, but is much preferable, in being already fluid and in being finer and blacker. Per bottle,	$0.25
	No. 2.—Waterproof Drawing Ink. This ink is best for all working architectural, map, or other drawing designed to stand moisture, rough handling, or washing over with colors. *Lines drawn with this ink will resist washing immediately after drawing.* It is not recommended for brush shading, but for lining or solid black work is superb. It is the best ink for Whatman's or other hard papers, on which it flows freely, giving fine solid black lines. Per bottle	.25
	Carmine,	.35
	Blue,	.25
	Green,	.25
	Scarlet,	.25

We can now send single bottles by mail at an extra cost of 10 cents per bottle.

Our Inks have now become staple articles, and dealers will do well to include them in their regular stock.

The Leading Liquid Drawing Ink.



Section of Bottle with Improved Combined Stopper and Pen Filler.

This Ink, first introduced in 1880 under the name of the "AMERICAN DRAWING INK," or the "AMERICAN INDIA INK," has now gone into general use, and is recognized as the leading drawing ink in the United States, having extensively displaced the original stick ink, and superseded all the crude liquid inks previously attempted. It is not a solid ink ground up, but **A NEW NATIVE INK**, made fluid from the outset; and it will never become gelatinous, thick or offensive, or deposit carbon, like all so-called "Liquid Inks" with which Draughtsmen have been heretofore afflicted. It thus fills the long felt want of Draughtsmen.

A PERFECT LIQUID INK.

ALWAYS READY. ALWAYS GOOD.

This Ink is put up in a special bottle (see cut), with a quill for filling the pen and an improved stopper, and is thus ready for instant use.

Beware of dealing in any inks not made by us, using the label title "Waterproof Drawing Ink," as such is an infringement on our label copyright No. 3693, and will leave the infringer liable to a suit for damages.

In order to avoid imitations that have been offered on account of the wonderful success of these inks, users will see that the "fac-simile" signatures of both inventor and sole agent are with each bottle.

Chas. M. Higgins.

Inventor.

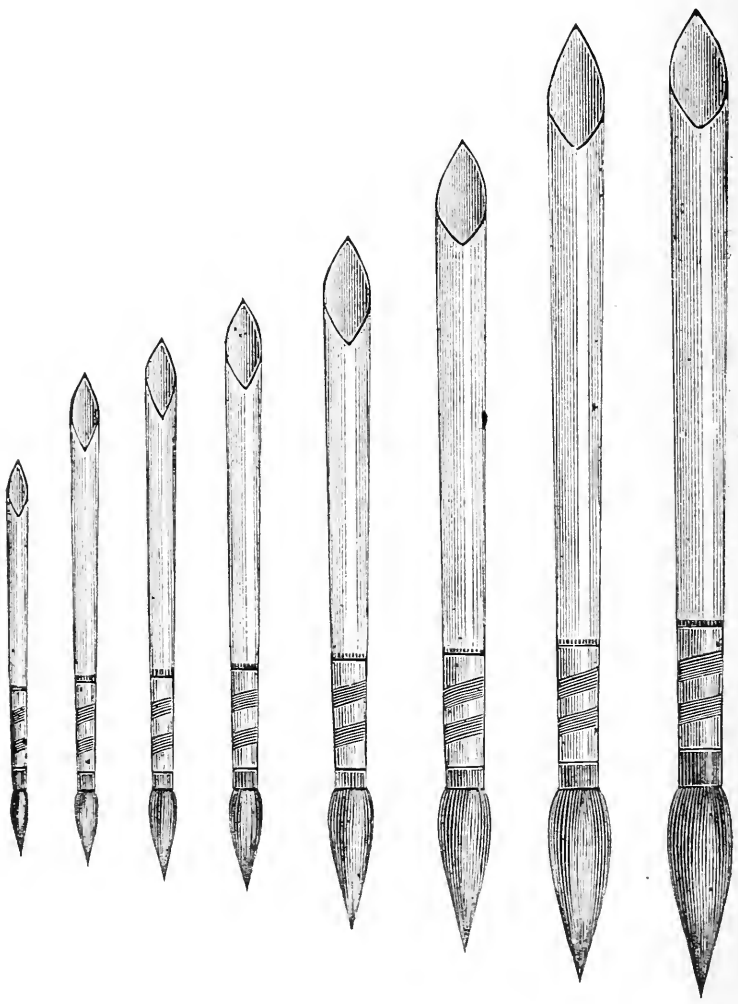
G. S. Woolman.

Sole Agent.

874. Empty Japanned Tin Boxes for Moist Colors, in Pans,

For 6 full or 12 half-pans each,					$1.25
For 12	"	24	"	"	1.50
For 16	"	32	"	"	2.50
For 24	"	48	"	"	3.00

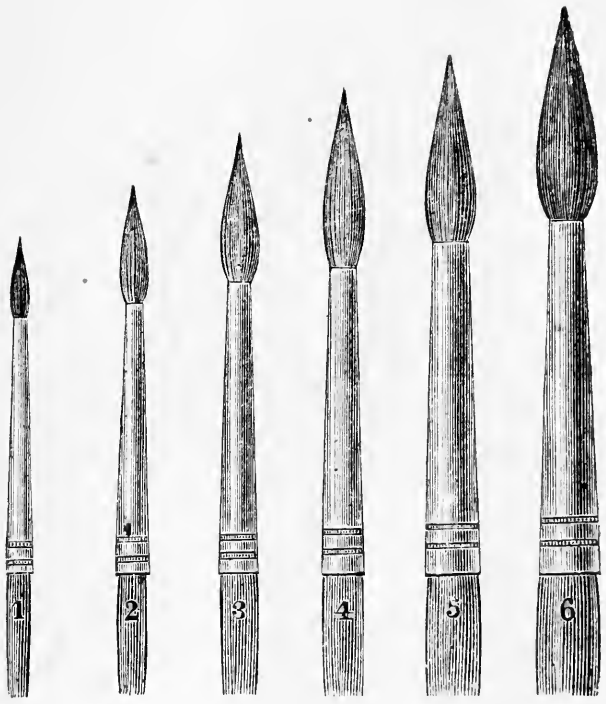
Camel's-Hair and Sable Brushes.



1. 2. 3. 4. 5. 6. 7. 8.

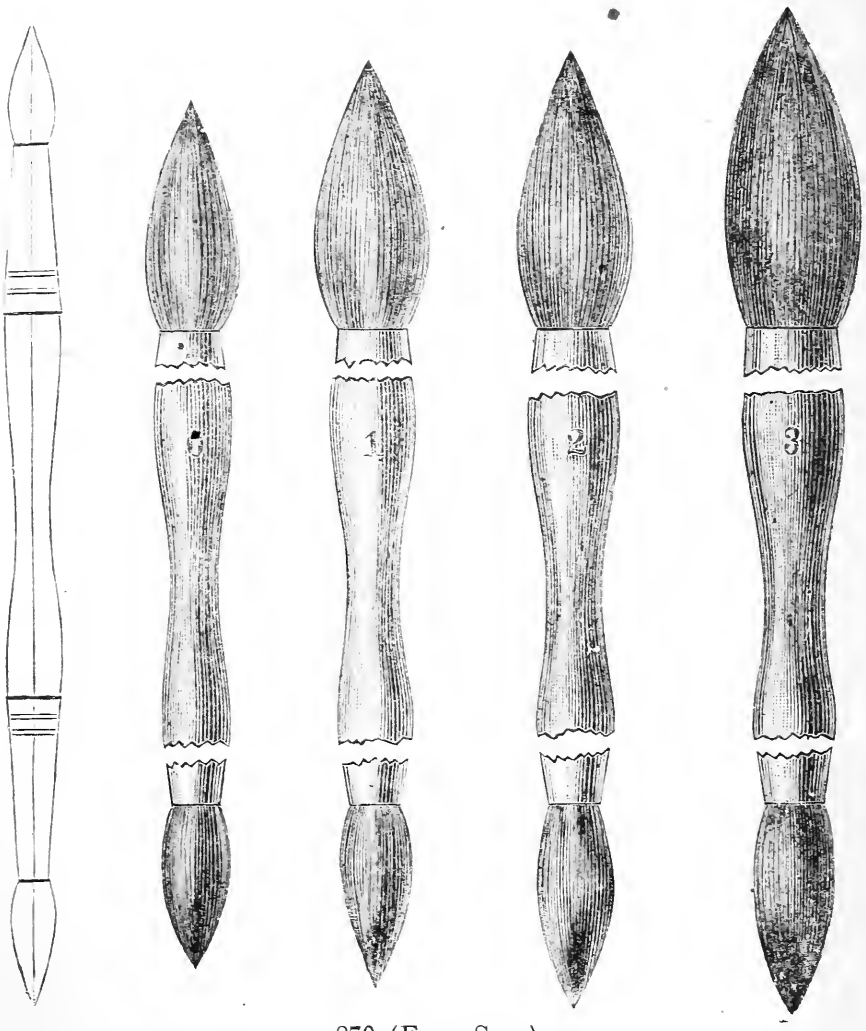
877 (Full Size).

No.		Price
877.	Camel's-hair Pencils, fine quality, in quills,	
	Nos. 1 and 2, each,	$0.05
	Nos. 3 and 4, each,	.06
	Nos. 5 and 6, each,	.08
	Nos. 7 and 8, each,	.10



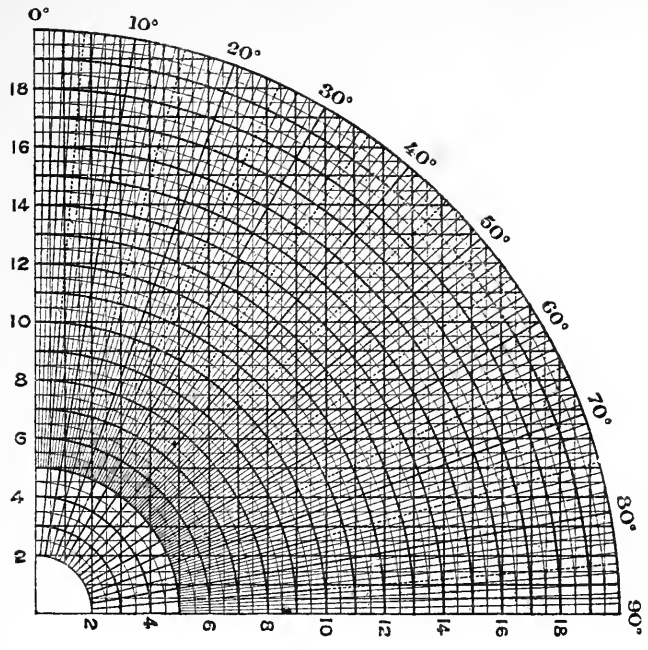
878 (FULL SIZE).

No.		PRICE.
878.	Camel's-hair Pencils, fine quality, wood handles, metal tubes.	
	Nos. 1 and 2, each,	$0.10
	Nos. 3 and 4, each,	.12
	Nos. 5 and 6, each,	.15



879 (FULL SIZE).

No.		PRICE.
879.	Double Camel's-hair Wash Pencils, fine quality, metal tubes, wood handles.	
	Nos. 0, each,	$0.40
	Nos. 1, each,	.50
	Nos. 2, each,	.60
	Nos. 3, each,	.75



THE

GRAPHIC TRAVERSE TABLE.

This useful diagram is rapidly growing in favor among engineers and surveyors. The calculation of latitudes and departures, even with the best books published, is a very tedious process, and few men can be certain of the accuracy of their work in the case of a long traverse. It is therefore necessary that the calculations should be checked. The labor involved in the operation of checking is as great as that of making the original calculations. Also of value in Bridge Building.

With the GRAPHIC TRAVERSE TABLE, the checking becomes very easy. Two persons working together can check from 175 to 200 courses in one hour. The results obtained agree very closely with the calculations; so closely, that in many instances the table can be used alone, and the calculations dispensed with, the average error not exceeding .001 per foot. It is not difficult to use, and any person can become expert with it after a few minutes' practice.

Full directions sent with each table. Printed on linen-backed paper. Size of diagram, 15 x 15 inches.

PRICE, ONE DOLLAR.

G. S. WOOLMAN,

116 FULTON STREET, NEW YORK.

MR. G. S. WOOLMAN,

Enclosed P. O. Money Order _____ *please send me articles as below, from* _____ *edition, Math. Catalogue. 189*.....

No.	

(FILL UP BLANKS.)

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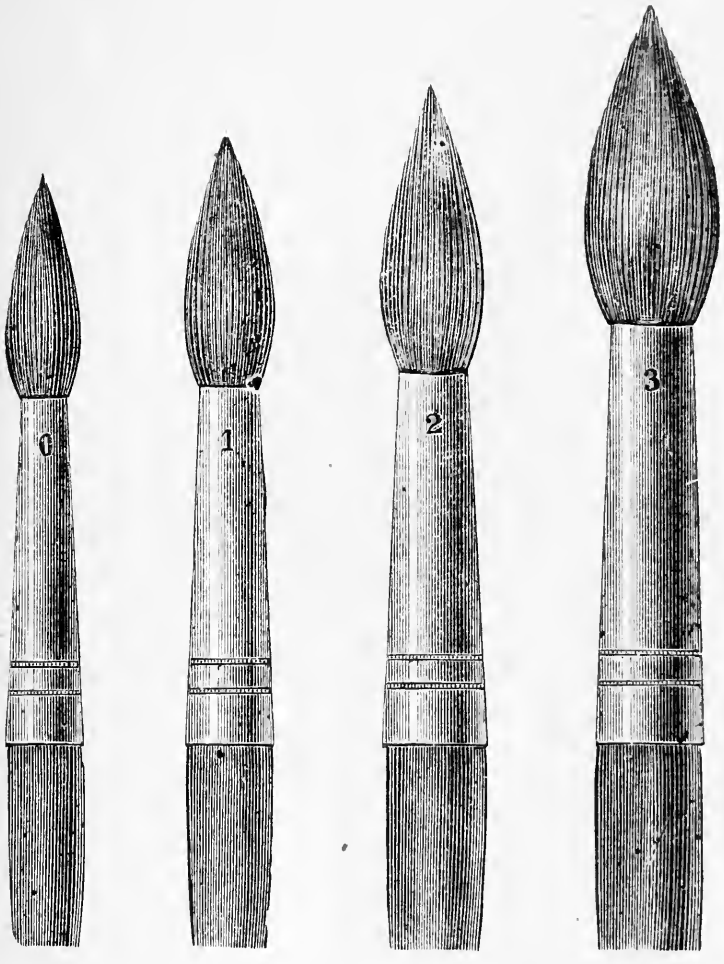
Post Office.....

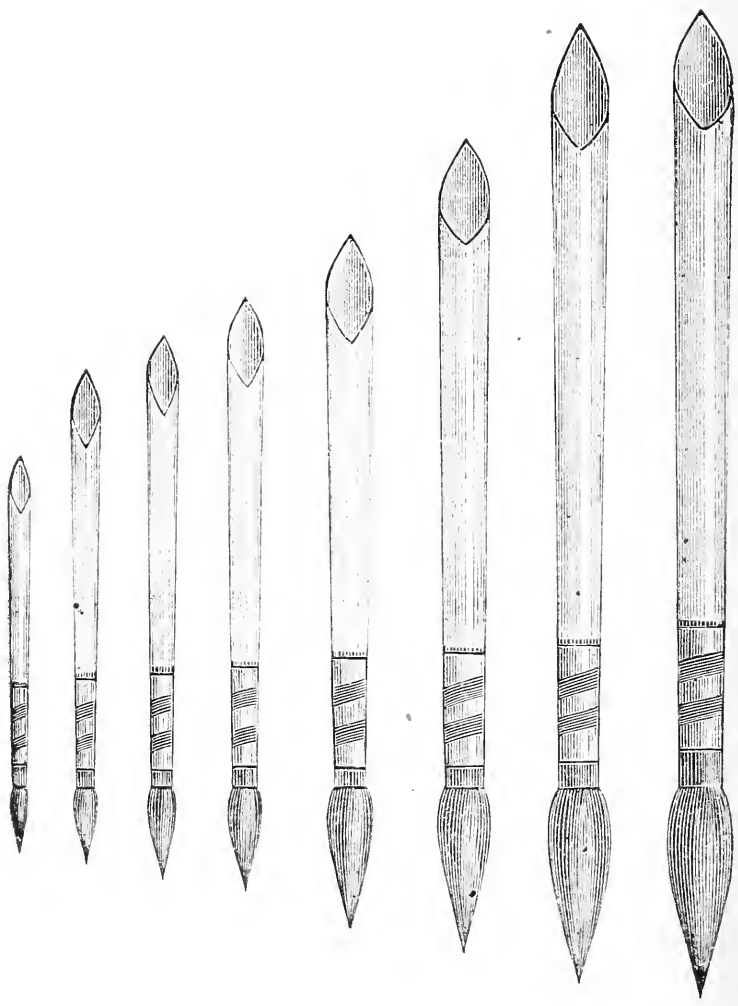
County.....

State.....



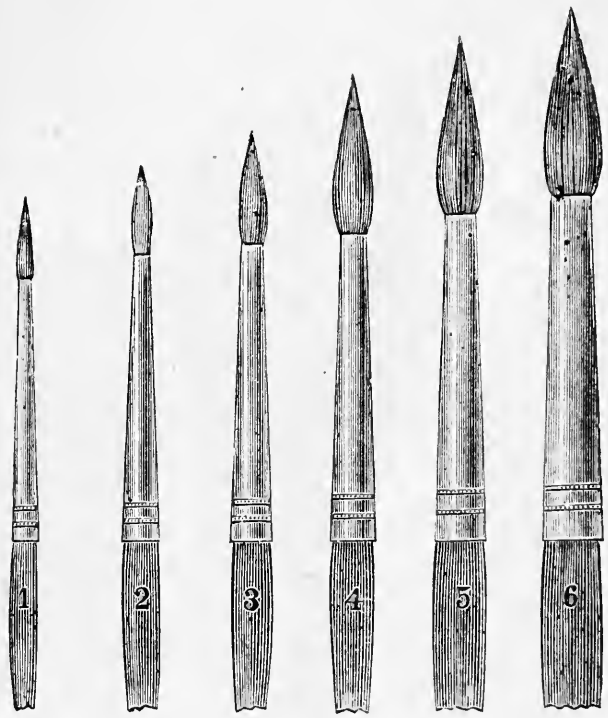
879½ (Full Size).

No.		Price.
879½.	Single Camel's-hair Wash Pencils, same quality and sizes as No. 879.	
	Nos. 0, each,	$0.20
	Nos. 1, each,	.30
	Nos. 2, each,	.35
	Nos. 3, each,	.45
880.	Large Camel's-hair Pencils and Swan Quill, fine quality.	
	Nos. 1 and 2, each,	.25
	Nos. 3 and 4, each,	.40
	Nos. 5 and 6, each,	.60



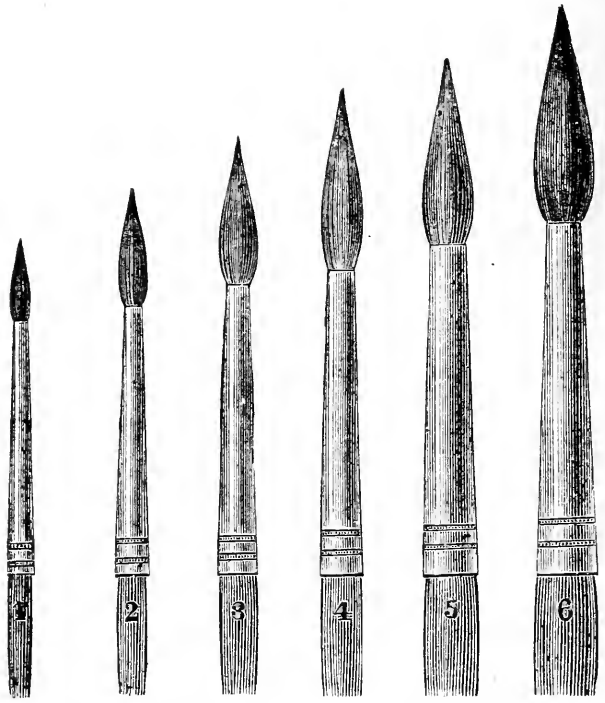
881 (FULL SIZE).

No.		Price.
881.	Red Sable Hair Pencils, in Quills.	
	Nos. 1 and 2, each,	$0.25
	Nos. 3 and 4, each,	.30
	Nos. 5 and 6, each,	.40
	Nos. 7 and 8, each,	.75



882.

No.		Price.
882.	Red Sable Hair Pencils, with black wood handles.	
	Nos. 1 and 2, each,	$0.25
	Nos. 3 and 4, each,	.40
	Nos. 5 and 6, each,	.70
882½.	Large Red Sable Hair Pencils in Swan Quills, fine quality.	
	No. 0,	2.50
	No. 1,	2.25
	No. 2,	2.00
	No. 3,	1.50
	No. 4,	1.00
	No. 5,	.75



883.

No.		Price
883.	Brown Sable Hair Pencils, with black wood handles, fine quality.	
	Nos. 1 and 2, each,	$0.30
	Nos. 3 and 4, each,	.45
	Nos. 5 and 6, each,	.80
883½.	Large Brown Sable Hair Pencils, in Swan Quills, fine quality.	
	Nos. 0, each,	3.00
	Nos. 1, each,	2.50
	Nos. 2, each,	2.00
	Nos. 3, each,	1.50
	Nos. 4, each,	1.00

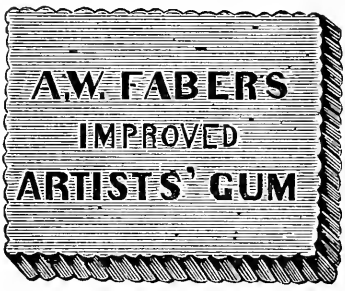
900. 901. 902. 903. 904. 905.

INDIA INK.

No.		Price.
900.	India Ink, sticks, four-sided black, gilt, 2 inches long, each,	$0.10
901.	Do. do. round, lion's head, gilt, 2½ inches long, each,	.25
902.	Do. do. do. do. 4 inches long, each,	.75
903.	Do. do. oval, do. 3 do. do.	.40
904.	Do. very superior, sticks, 3¾ by ¾ by ⅜ inches, do.	1.50
904½.	Do. same quality as 904, sticks 3¾ by ⅜ by ⅜ inches, each,	.75
905.	Do. Winsor & Newton's best sticks, square, 3½ inches long, each,	2.00
905—A.	Pearl, very fine, per cake,	3.00
B.	Gilt, extra quality, per cake,	4.00
C.	India Blue (Ultramarine),	.75
D.	India Reddish Brown (Bt. Sienna),	.75
E.	India Yellow (Chrome),	.75
F.	India Red (Vermilion),	.75
G.	India Lake (Crimson),	1.00
905½—A.	Japanese India Ink, oblong, 3¾x¾ inch, per cake,	1.00
B.	Do. do. extra large, fine quality,	3.00

The Chinese Inks are most suitable for general draughting. The Japanese, only for those drawings in which the ink-lines are frequently washed in applying water colors.

INDIA RUBBER.



906

No.							Price.
906—A.	A. W. Faber's, first quality,	$1\frac{1}{8}$x$\frac{7}{8}$	inches,	each,	. . . .		$0.05
B.	Do.	do.	$1\frac{1}{2}$x1	do	do.	. . . .	.06
C.	Do.	do.	$1\frac{3}{4}$x$1\frac{1}{4}$	do.	do.	. . . .	.12
D.	Do.	do.	2 x$1\frac{3}{8}$	do.	do.	. . . .	.20
E.	Do.	do.	3 x$2\frac{1}{8}$	do.	do.	. . . .	.50

906 F.

F.	A. W. Faber's Pointed Rubber,	3 x $\frac{3}{8}$	inches,	each,	. . .	.15
G.	Do.	do.	$2\frac{1}{2}$x$\frac{5}{16}$	do.	do.	. . .	.10

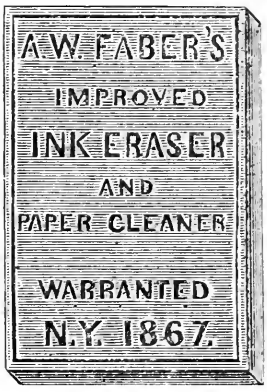
907.

907—A.	Davidson's Velvet Rubber, oblong,	1 x$\frac{7}{16}$	inch.	each,	. . .		.05
B.	Do.	do.	do.	$2\frac{3}{8}$x$\frac{1}{2}$	do.	do.	12
C	Do.	do.	do.	$3\frac{1}{4}$x$\frac{5}{8}$	do.	do.	20
908.	Standard Single Wedge,		do.	$2\frac{3}{4}$x$\frac{1}{2}$	do.	do.	15

909 C.

909—A.	Standard Double Wedge, oblong,	$1\frac{3}{4}$x$\frac{3}{4}$	inches,	each,	. . .		.05
B.	Do.	do.	do.	$2\frac{3}{4}$x$\frac{3}{4}$	do.	do.	15
C.	Do.	do.	do.	3 x1	do.	do.	20
910—A.	Faber's Black, Pure Gum,			2 x$1\frac{3}{8}$	do.	do.	20
B.	Do. do.	do.		$2\frac{3}{8}$x$1\frac{5}{8}$	do.	do.	35

912.



912½.

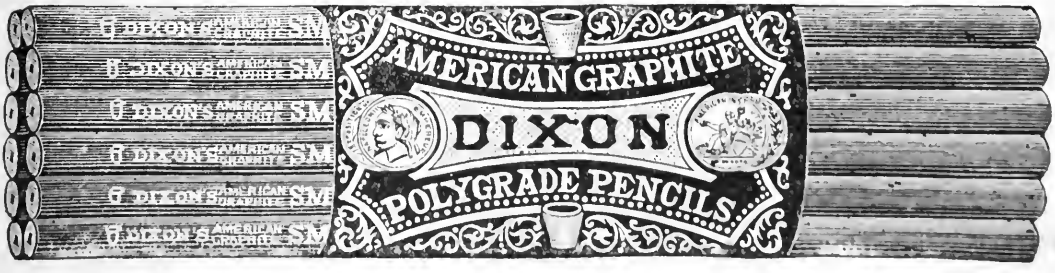
No.		Price.
912—A.	A. W. Faber's Combined Ink and Pencil Eraser, small, each,	$0.20
B.	Do. do. do. large, do.	.30
912½.	A. W. Faber's Improved Ink Eraser, small, 5 cents; large,	.10
912¾—A.	Sponge Rubber, for cleaning paper, pieces 1x1x¾, do.	.10
B.	Do. do. 2½x1¾x½, do.	.40
C.	Do. do. 4x2x1, do.	.75

LEAD PENCILS.

914.

913. A. W. Faber's Hexagonal gilt, Nos. 1, 2, 3, 4. 5, per dozen, . . .75

914. Do. Pure Siberian Lead, Nos. BBBBBB, BBB, BB, B, HB, F,H, HH, HHH, HHHHHH, very superior, 15 cents each, per dozen, ... 1.25



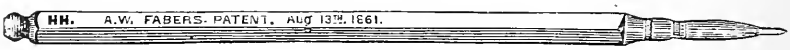
914½.

914½. American Lead Pencils, Grade S, SM, M, H, VH, for general drawing, ...60

915. A. W. Faber's small, round, for Divider Points, per dozen, ...75

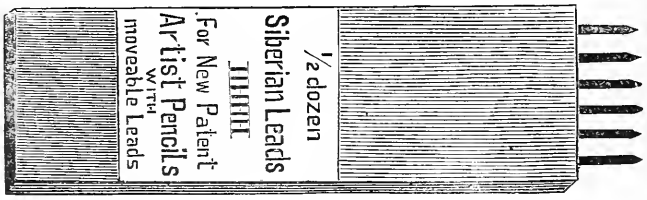
917. Red, Green, Blue, and Yellow Pencils, do. 1.25

918. J. W. Guttknecht's Pencils, Red at one end, Blue at the other, per dozen, ... 1.25



920.

No.		PRICE.
919.	Faber's Artists' Pencils, hexagonal, gilt, each,	$0 25
919½.	Do. do. 6 in a box, Nos. 1, 2, 4 or 5, per box,	.50



920½.

920.	Faber's Artists' Pencils, with Siberian Leads, each,	.35
920½.	Do. do. Leads, 6 in a box, Nos. 4B to 6H, per box,	.65

The Leads of Nos. 919½ and 920½ will fit the new pencil-holders in Alteneder and Swiss sets, No. 284, etc. Each box has only one grade of leads.

920¾—A.	Faber's Round Pencils, 5 in a box, per box,	.50
B.	Do. do. 7 in a box, do.	.65
C.	Do. Hexagon, gilt, 5 in a box, do.	.90
D.	Do. do. do. 7 in a box, do.	1.20
921—A.	Red Chalk Pencils, for marking stakes, best quality, per dozen,	1.25
B.	Do. do. in cedar, per dozen,	.75
C.	Do. Crayons, superior quality, per dozen,	.60
D.	Do. in lumps, per pound,	.30

CRAYONS.

922—A.	Black Conté Crayons, square, black, Nos. 1, 2 or 3, per dozen,	.20
B.	Do. do. in wood, Nos. 1 or 2, do.	.60
C.	Do. do. do. No. 3, do.	.90
D.	White, in wood, per dozen,	.60
E.	Faber's Wax Crayons, in cedar wood, assorted colors, in boxes; 6, 12, 18, 24, 36 colors, each, .75, $1.50, $2.00, $2.50, $3.25	

923—A.	Brass Crayon Holders, 4, 5 or 6 inch, each,	.07
B.	German Silver do. 4, 5 or 6 do. do.	.10
924.	Paper Stumps, assorted sizes, each,	.05

SOENNECKEN'S ROUND WRITING PEN.

925.	Single-pointed Pens, assorted, per gross, $1.10; per dozen,	.20
A.	Double-pointed Pens, assorted, per dozen,	.50
B.	Copy Book, without instructions,	.6
C.	Text Book for Round Writing, giving full instructions,	1.10
	Sample assortment of Pens, 25 in a box,	.35

No.		Price.
926.	Gillott's Mapping Pen, on cards, with holder, per gross, $6.00; per dozen,	$0.75
A.	Gillott's Lithographic Crow-quill Pens, on cards, with holder, per gross, $6.00; per dozen,	.75
B.	Gillott's Lithographic Pens, per gross, $5.00; per dozen,	.75
C.	Do. No. 170 Pen, per gross, $1.25; do.	.15
D.	Do. No. 303 Lettering Pen, per gross, $1.50; per dozen,	.20
E.	Do. No. 104 do. do. 1.25; do	.20
F.	Esterbrook's Engraving Pens, per gross, 1.00; do.	.20
G.	Do. Falcon Pen, do. .75; do.	.15
H.	Do. Commercial Pen, do. .75; do.	.15

MISCELLANEOUS STATIONERY.

927.	Rogers' Steel-blade Eraser, cocoa handles, each,	.60
A.	Do. do. do. with ivory handle,	.75
B.	Do. do. do. with ebony do. double-edged, combining knife and eraser,	1.00
Best Foolscap Paper, $7\frac{3}{4}$x$12\frac{1}{4}$ inches, per ream, $5.00; per quire,		.35
Best Letter Paper, 8x10 inches, do. 4.50; do.		.30
Best Commercial Note, 5x8 inches, do. 2.75; do.		.20
Superior Post-office Paper, buff tint, do. 7.50; do.		.50
Best Flat Paper, smooth, suitable for sensitizing:		
Demy,	16x21 inches, per ream, $9.50, per quire,	.60
Medium,	18x23 do. do. 15.00, do.	.90
Royal	19x24 do. do. 17.00, do.	1.00
Superroyal,	20x28 do. do. 24.00, do.	1.40
Imperial,	23x31 do. do. 30.00, do.	1.65
Elephant,	23x38 do. do. 32.00, do.	1.75
Double Elephant,	27x40 do. do. 60.00, do.	4.00
Antiquarian,	31x53 do. do. 125.00, do.	7.50
Superior White Envelopes, letter size, per 1,000,		4.00
Do. Buff do. do. do.		3.50
Do. do. do. Legal, letter size, per 1,000,		7.00
Arnold's Writing Ink, per quart,		.75
Do. Copying do. do.		1.25
David's Carmine, in 2-ounce bottles, glass stopper, per bottle,		.50
Copying Book, letter size, each,		2.50
Mucilage, per quart, $1.25; per cone (3 ounce),		.25
Rubber Bands, $\frac{1}{4}$ inch wide, 2 inches long, per gross, $0.90; per dozen,		.12
Do. $\frac{1}{4}$ do. $2\frac{1}{2}$ do. do. 1.15; do.		.15
Do. $\frac{1}{4}$ do. 3 do. do. 1.35; do.		.20
Do. $\frac{1}{4}$ do. $3\frac{1}{2}$ do. do. 1.50; do.		.25
Do. $\frac{1}{2}$ do. 2 do. do. 1.75; do.		.25
Do. $\frac{1}{2}$ do. $2\frac{1}{2}$ do. do. 2.00; do.		.30
Do. $\frac{1}{2}$ do. 3 do. do. 2.25; do.		.35
Do. $\frac{1}{2}$ do. $3\frac{1}{2}$ do. do. 2.50; do.		.40
Do. $\frac{1}{2}$ do. assorted lengths, do. 2.00.		
Do. $\frac{1}{16}$ do. $1\frac{1}{4}$ inches long, for tickets, etc., per gross,		.25

All other sizes Rubber Bands furnished at proportional rates.

Sand-paper Tablets, for pointing pencils, No. 1 Medium, No. 2 Rough, each,	.15
Files, mounted on blocks, No. 1, No. 2, each,	.25

Arkansas Oil Stones, from 25 cents to $2.00 each.
Do. do. in cases, from $1.00 to $2.50 each.

SOLID SKETCH BLOCKS.

Each Block consists of 32 leaves of best quality Whatman's Drawing Paper.

						Price.
16mo	Royal,	4½x 6,	unbound,	$0.65	*bound,	$1.25
8vo	do.	6 x 9,	do.	1.00	do.	1.85
4to	do.	9 x12,	do.	1.75	do.	3.00
Half	do.	12 x18,	do.	3 00	do.	4.50
32mo	Imperial,	3½x 5½,	do.	.55	do.	1.00
16mo	do.	5½x 7,	do.	.80	do.	1.50
8vo	do.	7 x10,	do.	1 40	do.	2.50
4to	do.	10 x14,	do.	2.50	do.	3.75
Half	do.	14 x20,	do.	4.25	do.	6.00

*The binding has Cloth Sides and Leather Back, with a Portfolio and Loop for Pencil inside. The Portfolio will last for a number of blocks.

INDUSTRIAL DRAWING COPIES

for Mechanics and Students in Industrial Evening Schools. Prepared, under the superintendence of Prof. Walter Smith, by James E. Stone.

24 large Folio Plates, as below, unmounted, per set,	6.00
Do. do. do. mounted, do.	15.00

ISOMETRIC PROJECTIONS.

Plate 1. Angular Bodies, mounted on pasteboard,	.75
Do. 2. Curved Surfaces and Bodies,	.75

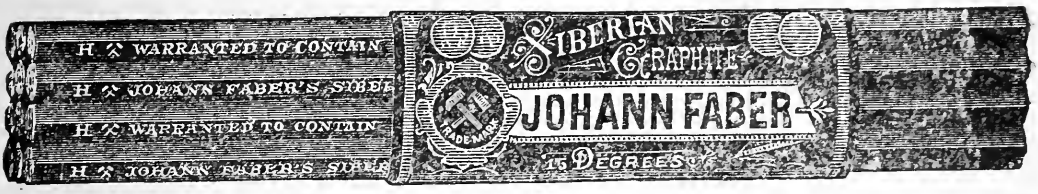
CARPENTRY.

Plate 1. Framing,	.75
Do. 2. Framing for Front and Side Elevation,	.75
Do. 3. Framing,	.75
Do. 4. Details of Framing,	.75
Do. 5. Details of Framing,	.75
Do. 6. Details of Roof,	.75
Do. 7. Details of a Door,	.75
Do. 8. Joints,	.75

MACHINERY.

Plate 1. Screws, Bolts, and Nuts,	.75
Do. 2. Theory of Screws and Tops of Bolt Heads,	.75
Do. 3. Stub End,	.75
Do. 4. Pillow-block,	.75
Do. 5. Eccentric and Shaft and Eccentric Strap,	.75
Do. 6. Wrench,	.75
Do. 7. Vise,	.75
Do. 8. Faucet and Hand Punch,	75
Do. 9. Spur Gear,	.75
Do. 10. Approximate Method of Drawing Spur Gear,	.75
Do. 11. Bevel Gear,	.75
Do. 12. Plan of a Steam-engine,	.75
Do. 13. Elevation of Steam-engine,	.75
Do. 14. Details of Steam-engine,	75
Price per plate, unmounted,	.35

LEAD PENCILS.



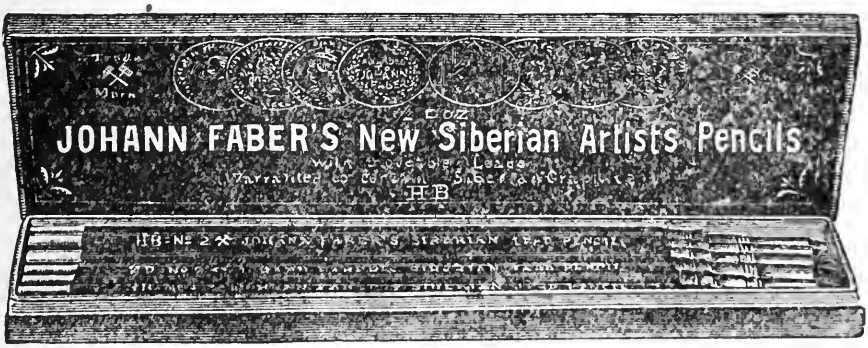
JOHANN FABER'S NEW SIBERIAN LEAD PENCILS.

		Price.
A–1321.	Warranted to contain Siberian Graphite and degree, 6 B, 5 B, 4 B, 3 B, 2 B, B, HB, F, H, 2 H, 3 H, 4 H, 5 H and 6 H, each, 15 cents; per dozen	$1 25

SIBERIAN PENCILS IN DRAWING SETS.

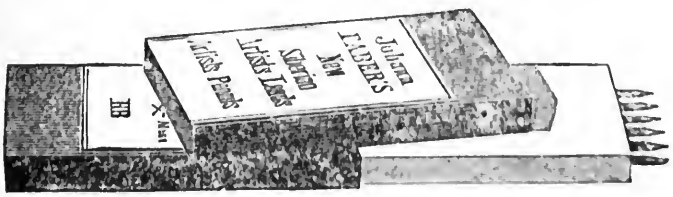
Johann Faber's Siberian Pencils,	5	in a box		$1 00
"	"	7	"	1 25
"	"	10	"	1 60
"	"	5	"	1 25

With knife and rubber.



SIBERIAN ARTISTS' PENCILS.

6 H—6 B, each	$ 30
Double-pointed ends, F and 2 H, 2 B and HB, each	40



SIBERIAN ARTISTS' LEADS.

6 B—6 H, in boxes of six leads, per box	$ 60

JOHANN FABER'S NEW POLYGRADE PENCILS.

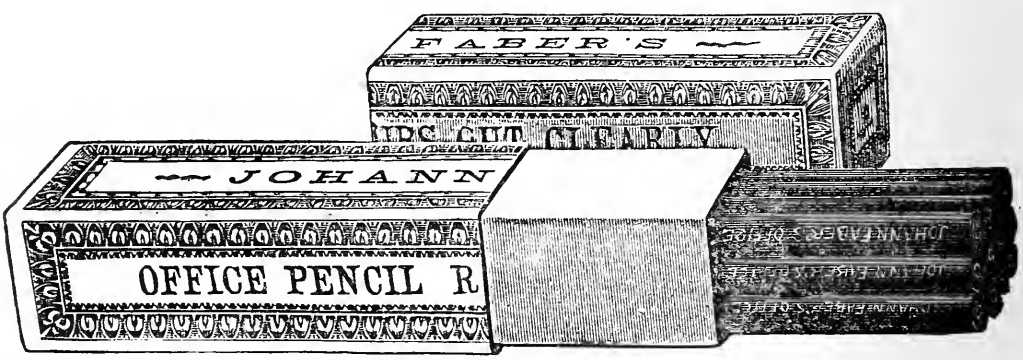
Round, black polished, gold, No. 1, 2, 3, 4 (round gilt), per dozen . . . . . $ 50

Hexagon, red polished, gold, No. 1, 2, 3, 4, 5 (hexagon gilt), per dozen . . . $ 75

Finest and best Hexagon, red polished, gold, 6 B—6 H, per dozen $1 00
Round, natural polished, silver, 4 B—4 H (English round), per dozen 50

JOHANN FABER'S NEW PENCILS IN CEDAR.

Hexagon, red polished, silver stamp, No. 1, 2, 3 (red silver) per dozen . . . $ 40
" black stained cedar, red polished, silver stamped Dessin, No. 1, 2, 3, 4 (Dessin silver), per dozen 60



JOHANN FABER'S NEW OFFICE PENCIL.

1 dozen in pull-off box, per dozen . . . . . $ 75

JOHANN FABER'S POLYGRADE ARTISTS' PENCILS.

WITH MOVABLE LEADS.

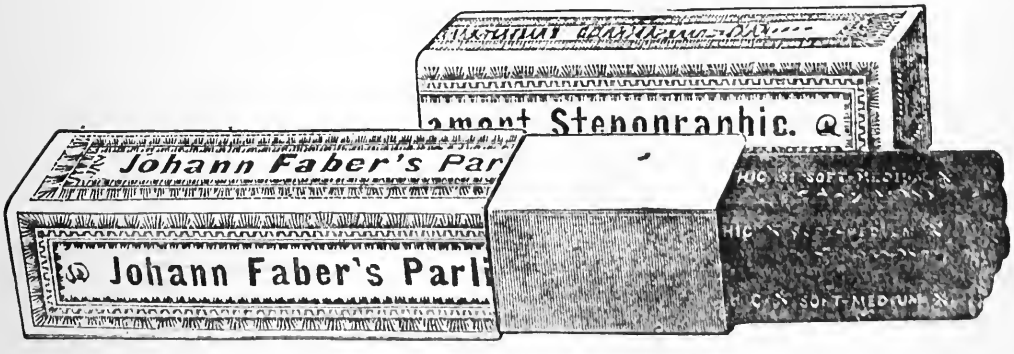
Hexagon, red polished, gold stamp, No. 1, 2, 3, 4, 5, each 25
Artists' Leads for the above, Nos. 1, 2, 3, 4, 5, 6 leads in a box, per box 50

JOHANN FABER'S DRAWING SETS.

CONTAINING

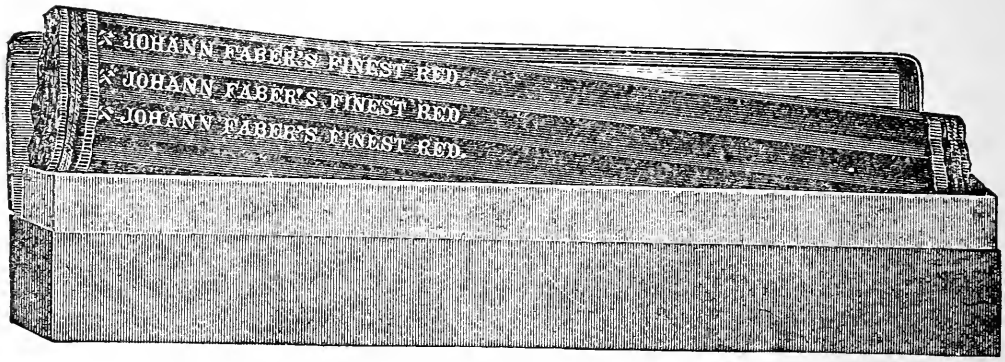
4 Round gilt, No. 1, 4, in pull-off card-board case, each 25
5 English, natural polished, silver, in wood case, " 50
7 " " " " 65
5 " " " " 75

With knife and rubber.



JOHANN FABER'S NEW PARLIAMENT STENOGRAPH LEAD PENCILS.

In 4 degrees—soft, soft medium, medium, hard—round, gold stamped per doz., $ 75
" " " " " hexagon, " " 90



JOHANN FABER'S COLORED PENCILS IN CEDAR.

Red and blue, hexagon, red pol., gold stamp (blue at one end, red at other), 9 inches long, in boxes of 1 dozen, per dozen	$1 25
Carmine pencils, hexagon, red pol., gold stamp, 7 inches long, in boxes of 1 dozen, per dozen	1 00
Blue pencils, hexagon, blue pol., gold stamp, 7 inches long, in boxes of 1 dozen, per dozen	1 00
Red pencils, round, red pol., gold stamp, 7 inches long, in boxes of 1 dozen, per dozen	80
Blue pencils, round, blue pol., gold stamp, 7 inches long, in boxes of 1 dozen, per dozen	75
Green pencils, round, green pol., gold stamp, 7 inches long, in boxes of 1 dozen, per dozen	75

NEW TRIANGULAR RED AND BLUE PENCILS IN CEDAR.

Carmine, triangular, red polished, silver stamp, per dozen	$1 00
Blue, " blue " " "	1 00
Carmine and blue triangular, red polished, silver stamp, per dozen	1 00

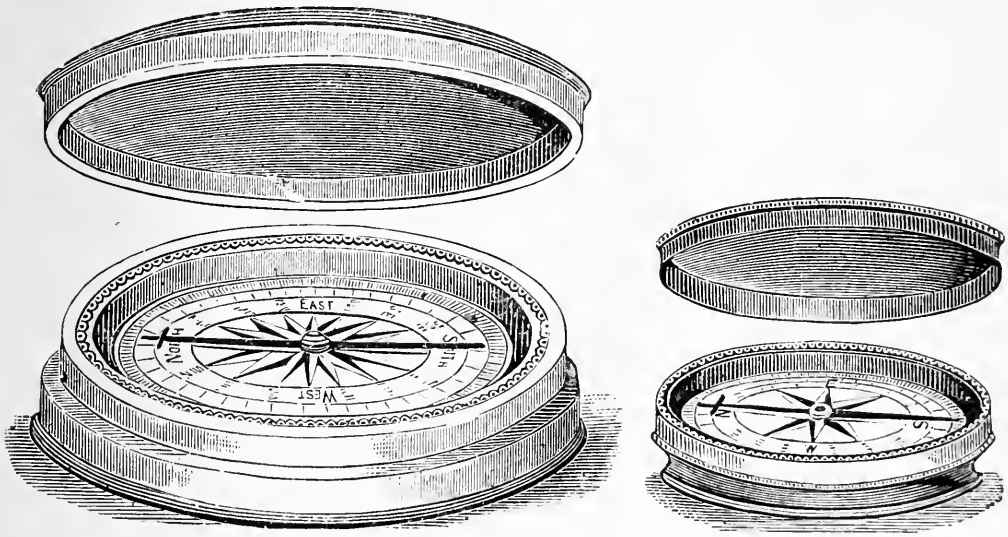
JOHANN FABER'S WAX CRAYONS OR CRETA LAEVIS PENCILS.

(48 SHADES.)

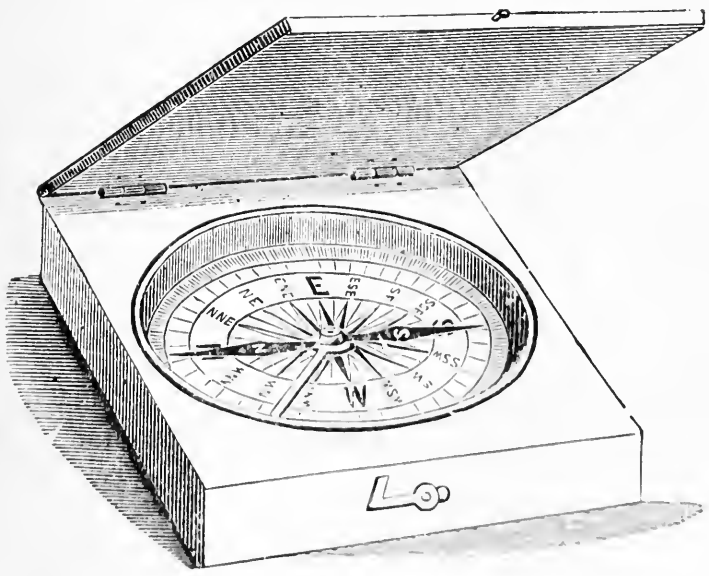
Box containing 6 wax crayons, polished, each	75
" 12 " " "	1 50
" 18 " " "	2 00
" 24 " " "	2 50

CHAPTER XI.

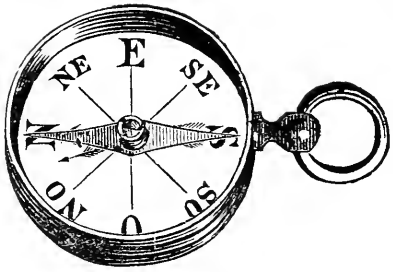
POCKET COMPASSES.



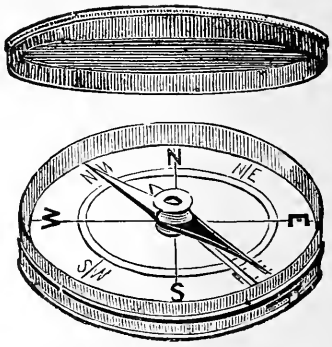
930.



933.

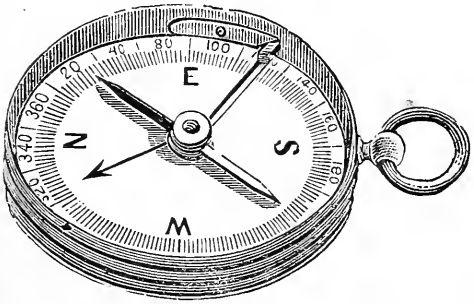


931.

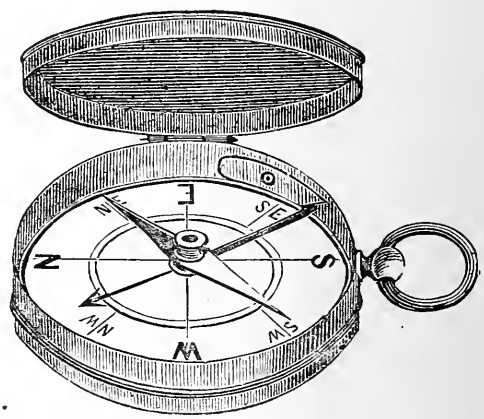


937*a*.

No.		Price.
930.	Pocket Compass, round wood case, no stop to needle,	$0.50
931.	Do. brass, round, 1½ inches in diameter, with cover, no stop to needle,	.50
932*a*.	Pocket Compass, watch pattern, brass, 1 inch diameter, no stop to needle,	.50
932*b*.	Same as above, but 1½ inches in diameter,	.65
932*c*.	Do. do. but 1 do do. and stop to needle,	.65
932*d*.	Do. do. but 1½ do. do. do. do.	.90
933.	Pocket Compass, mahogany case, 1½ inches square, with stop to needle,	1.50
934.	Do. same as 933, 2 inches square,	2.00
935.	Do. do. 2½ do.	2.25
936.	Do. do. 3 do.	2.75
937*a*.	Do. brass, round, with cover, 1½ inches diameter, with stop to needle,	1.25
937*b*.	Pocket Compass, same as 937*a*, but with agate centre to needle,	1.75



943*a*.

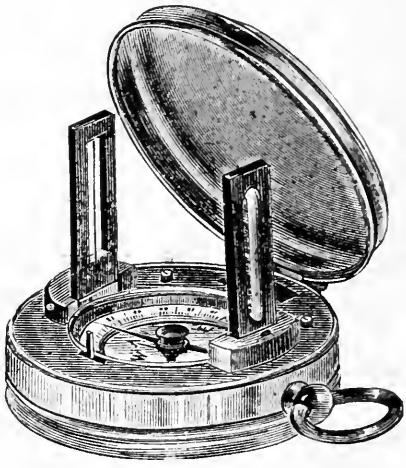


945*a*.

943*a*.	Pocket Compass, of brass, round, 1½ inches diameter, with stop and agate centre to needle,	1 25
943*b*.	Pocket Compass, same as 943*a*, but nickel-plated,	1.50
944*a*.	Do. watch pattern, brass, 2 inches diameter, with stop and agate centre to needle,	1.50
944*b*.	Pocket Compass, same as 944*a*, but nickel-plated,	1.75
945*a*.	Do do. brass, 1½ inches diameter, with hinged cover, stop and agate centre to needle,	1.75

No.				Price.
945*b*.	Pocket Compass, same as 945*a*,		but nickel-plated,	$2.00
945*c*.	Do.	do.	but German silver,	2.50
945*d*.	Do.	do.	but 2 inches diameter, with nickel-plated case,	2.50

946*a*.



947*a*.

946*a*. Pocket Compass, watch pattern, nickel-plated hunting case, bar needle, 1½ inches in diameter, raised ring, metal face, ... 4.00

946*b*. Pocket Compass, watch pattern, nickel-plated, but 1¾ inches in diameter, ... 4.50

947*a*. Pocket Compass, nickel-plated hunting case, raised ring, stop to needle, folding sights, 2 inches in diameter, ... 4 25

947*b*. Pocket Compass, nickel-plated hunting case, raised ring, stop to needle, folding sights, but 2¾ inches in diameter, ... 7.00

947*c*. Pocket Compass, nickel-plated hunting case, raised ring, stop to needle, folding sights, with levels, ... 8.00

948*a*.

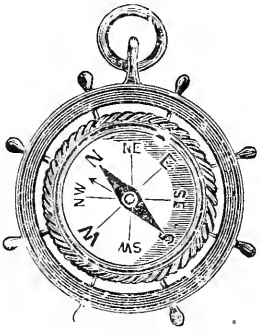
949*a*.

948*a*. Pocket Compass, watch pattern, gilt, enameled or metal face, stem stop. Bar needle, 1¼ inches in diameter, ... 5.00

No.		Price.
948*b*.	Pocket Compass, same as 948*a*, but 1½ inches in diameter,	$6.00
948*c*.	Do. do. but 1¾ do. do.	7.00
948*d*.	Do. nickel-plated or gilt case, with hinged cover, spring catch and stop to needle in joint of cover,	3.75
948*e*.	Bar Needle, nickel-plated or gilt case, with hinged cover, spring catch and stop to needle in joint of cover, 2 inches in diameter,	5.00
949*a*.	Pocket Compass, watch pattern, gilt, stem stop, in case, 1¼ inches diameter, Singer's patent pearl dial,	5.50
949*b*.	Pocket Compass, watch pattern, gilt, stem stop, in case, 1½ inches diameter, Singer's patent pearl dial,	6 00
949*c*.	Pocket Compass, watch pattern, gilt, stem stop, in case, 1¾ inches diameter, Singer's patent pearl dial,	6.50

CHARM COMPASSES.

950*a*.



950*b*.

950*d*.

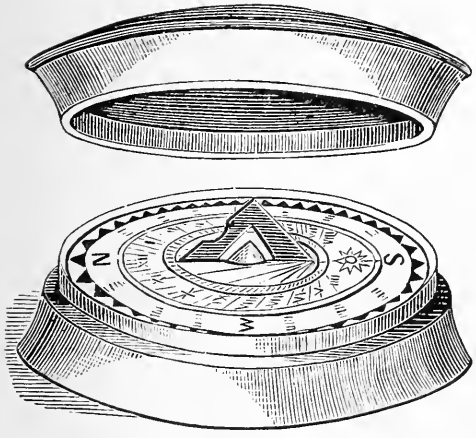
950*a*.	Gilt, round, ½ inch,	.25
950*b*.	Do. 1 do.	.50
950*c*.	Gilt band, with glass on each side, ¾ inch,	1.50
950*d*.	Nickel-plated, gimbal mounted; small, $2.00; medium, $2.25; large,	2.50
950*e*.	Gold, round case, engraved back, ½ inch in diameter,	3.50
950*f*.	Gold, round case, engraved or stone back, ¾ inch diameter,	5.00
950*g*.	Gold, anchor pattern, ¾ inch diameter,	7.50
950*h*.	Gold, plain band, pebble compass, ¾ inch diameter, each,	10.00

BOAT COMPASSES.

Boat Compass, floating card dial, double gimbal mounting, nickel-plated case with cover.

1¾ inch diameter,	4 25
3 inches diameter,	6 00
4½ inches diameter,	14.00

SUN-DIAL COMPASSES.

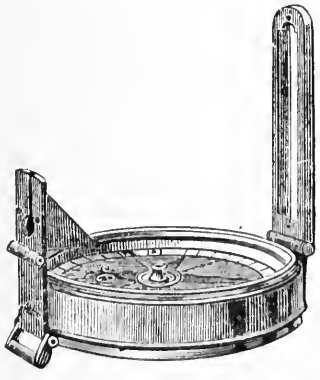


952.

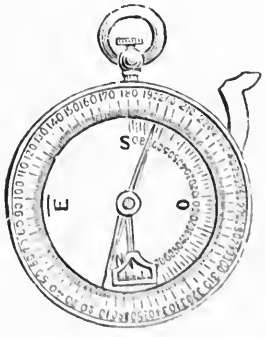
955.

No.		Price.
952.	Pocket Compass and Sun-dial, wood box, with cover,	$0.50
953.	Do. mahogany case, with Universal Sun-dial,	8.00
954.	Do. brass, with levels and leveling screws, and Universal Sun-dial,	14.00
955.	Pocket Compass, brass, with hinged cover and Sun-dial, 2 inches diameter,	4.00
956.	Pocket Compass, brass, with hinged cover and Sun-dial, 2½ inches diameter,	5.50

Sun-dials, for lawn use, made to order for any latitude.



957.



959.

957.	Prismatic Azimuth Compass, of brass, 2¾ inches diameter,	18.00
958.	Do. do. do. 4 do.	22.00
959.	Geological Compass, of brass, with pendulum for ascertaining the angle of dip in rocks, each,	4.50
960.	Geological Compass, same as No. 959, but made of German silver,	5.50

961.

961½.

No.		Price.
961.	Miner's Compass, for tracing iron ore,	$12.00
961½.	Do. do. Norwegian Needle, glass both sides, with brass covers, 3-inch needle,	12.00
961¾.	Same as above, but with 4-inch needle,	15.00

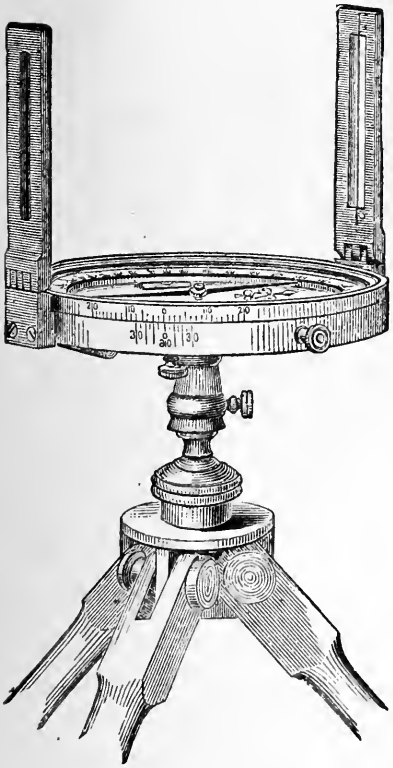
This consists essentially of a dipping-needle, about 2½ inches long, which inclines toward any mass of iron, and thus discovers its position.

When used for tracing ore, the observer should hold the ring in his hand, and keep the needle north and south, standing with his face to the west.

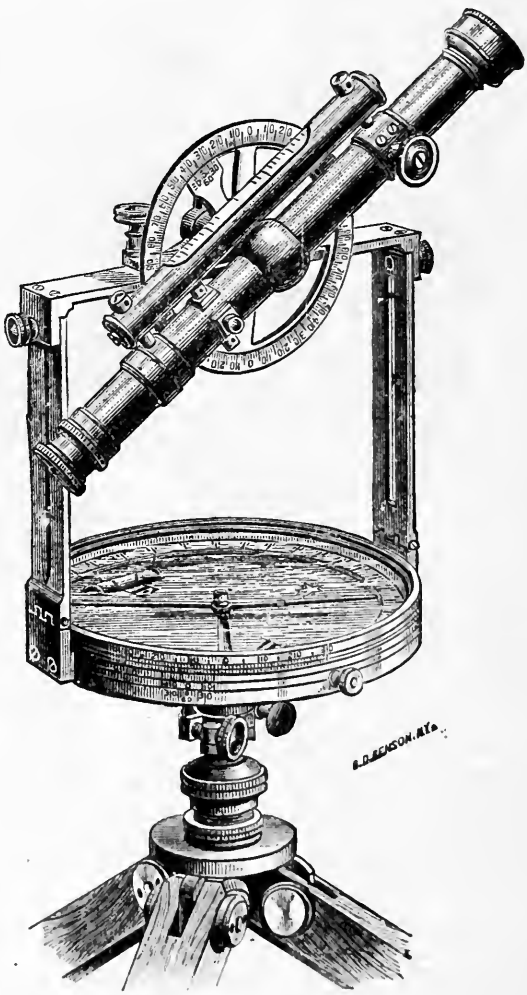
If held horizontal, it serves, of course, as an ordinary pocket compass.

CHAPTER XII.

SURVEYOR'S COMPASSES, TRANSITS, LEVELS, AND LEVELING RODS.



962, with Tripod.

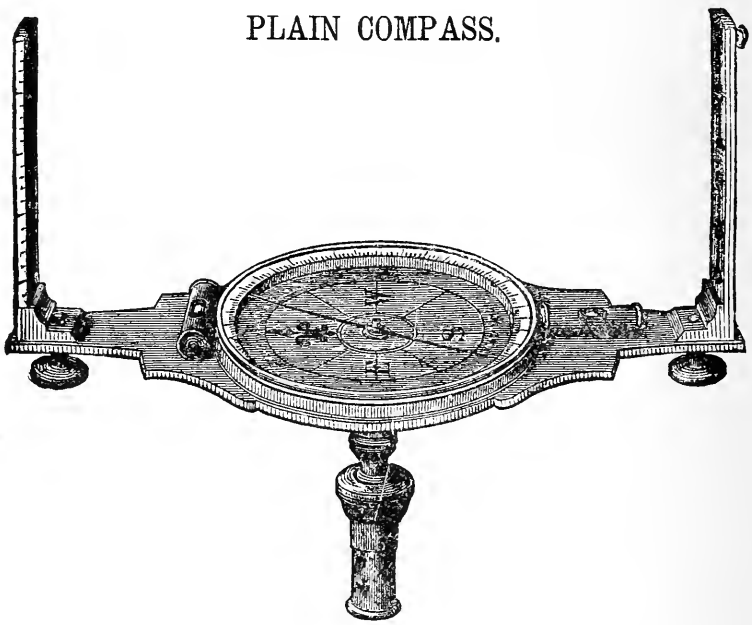


965½.

No.		Price.
962.	Surveying Compass, with folding sights, needle 3½ inches long, nonius on side of compass, box for adding and subtracting magnetic variations, two straight levels, Jacob Staff mountings,	$16.00
962½.	Same as above, but with 4½-inch needle,	18.00
962¾.	Tripod for Compasses, 962 or 962½, each,	5.00
963.	Surveying Compass, same as No. 962, but without nonius, needle 3½ inches long,	13.50

No.		Price.
964.	Surveying Compass, same as No. 962. without levels and nonius, needle $3\frac{1}{2}$ inches long,	$12.00
965.	Surveying Compass, same as No. 964, but needle $2\frac{1}{2}$ inches long,	10.00
	Tripod, with cherry legs, for any of above compasses,	7.00
$965\frac{1}{2}$.	Vernier Pocket Compass, $3\frac{1}{2}$-inch needle, with clamp and tangent to spindle, and fitted with Telescopic Sight No. 1, with extras of level on telescope, vertical circle with vernier reading to five minutes, and clamp and tangent to axis of telescope, including tripod,	55.00

PLAIN COMPASS.

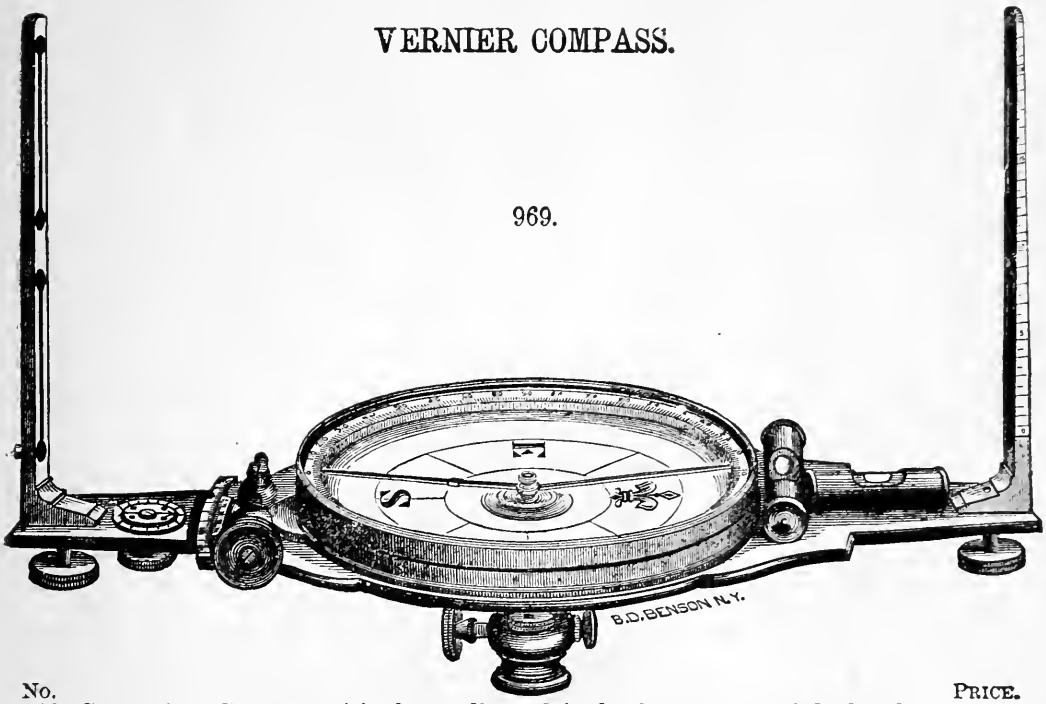


966.

No.		Price.
966.	Surveying Compass, 4-inch needle, $12\frac{1}{2}$-inch plate, two straight levels, Jacob Staff mountings, and sights graduated for taking angles of elevation and depression,	$25.00
967.	Surveying Compass, 5-inch needle, $15\frac{1}{2}$-inch plate, two straight levels, outkeeper and Jacob Staff mountings, and sights graduated for taking angles of elevation and depression,	30.00
968.	Surveying Compass, 6 inch needle, $15\frac{1}{2}$-inch plate, two straight levels, outkeeper and Jacob Staff mountings, and sights graduated for taking angles of elevation and depression,	35.00

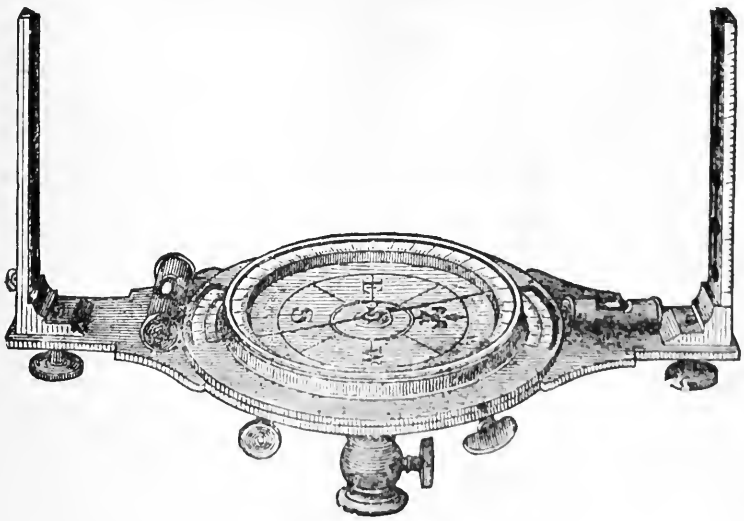
VERNIER COMPASS.

969.



No.		Price.
969.	Surveying Compass, 4-inch needle, 12½-inch plate, two straight levels, outkeeper and nonius for adding or subtracting the magnetic variations of the needle, and sights graduated for reading angles of elevation and depression,	$30.00
970.	Surveying Compass, same as No. 969, but with 5-inch needle and 15½-inch plate,	35.00
971.	Surveying Compass, same as No. 969, but has 6-inch needle and 15½-inch plate,	40.00

THE RAILROAD COMPASS.



973.

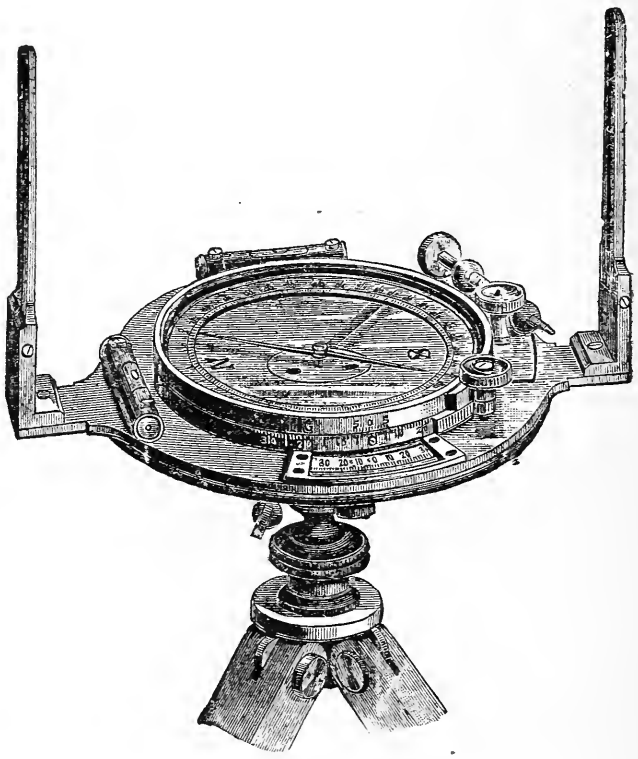
The Railroad Compass has the Main Plate, Levels, Sights, and Needle of the ordinary Surveying Compass, but has also underneath the main plate a divided circle or limb by which horizontal angles to single minutes can be read independently of the needle.

973.	Railroad Compass, 5-inch needle and with one vernier to limb, and sights graduated to read angles of depression or elevations,	$60.00

No. PRICE.

974. Railroad Compass, 5½-inch needle, with one vernier to limb, and sights graduated to read angles of depression or elevation, ... $60.00

975. Same as No. 974, but with two verniers to limb, ... 75.00



975½.

975½. Railroad Compass, 4½-inch needle, clamp and tangent movement to limb, vernier reading to single minutes, complete with tripod, . . 45.00

976. Tripod, with cherry legs, furnished to any of the compasses from Nos. 962 to 975, ... 7.00

977. Tripod, with cherry legs, with parallel plates and leveling screws, and clamp and tangent movement, furnished to any of the compasses from 962 to 975, ... 18.00

All of the compasses are packed in handsome mahogany boxes.

VERNIER TRANSIT.

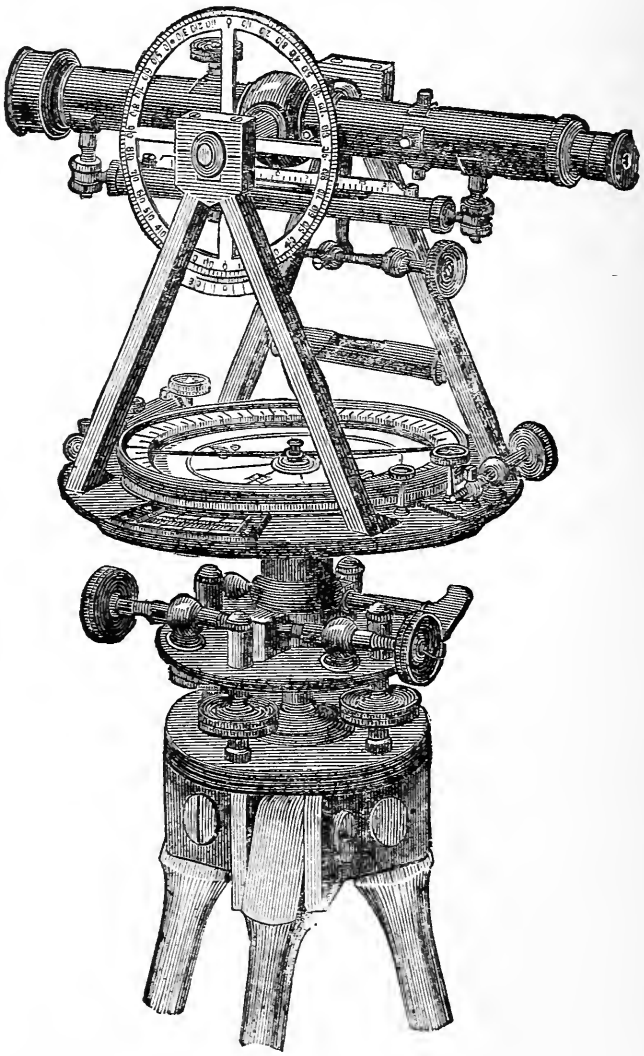
979.

The Vernier Transit, or Transit Compass, has the same general properties as the Vernier Compass No. 969, but is furnished with a telescope in place of the ordinary sights. The Telescope is from ten to twelve inches long, and sufficiently powerful to see and set a flag at a distance of two miles, in a clear day.

978. Transit Compass, with needle 4 inches long, and light tripod, . . $70.00
979. Transit Compass, same as No 978, but with vertical circle 3½ inches diameter and clamp and tangent movement to Telescope, . . 84.00
980. Transit Compass, with needle 5 inches long and light tripod, . . 70.00
981. Transit Compass, same as No. 980, but with vertical circle 3½ inches diameter and clamp and tangent movement to Telescope, . . 84.00

No.		Price.
982.	Transit Compass, with needle 6 inches and light tripod . . .	$75.00
983.	Transit Compass, same as No. 982, but with vertical circle and clamp and tangent movement to Telescope, ...	89.00
	Sights with folding joints on Telescope to either Transit Compass from 978 to 983, ...	8.00
	Right Angle Sights on standards of either Transit Compass from 978 to 983.	8.00

SURVEYORS' TRANSITS.



985.

The Surveyor's Transit, as above illustrated, has a Telescope, from ten to twelve inches long, constructed with the finest lenses; under the telescope a level is attached for taking such levels as may occur in the practice of a surveyor. On one end of the axis of the telescope a divided circle, 4½ inches diameter, is attached for reading to minutes angles of elevation and depression. The rim of the compass box is divided to ½ degrees, and is provided with a nonius for adding and subtracting the magnetic variations of the needle. The limb on the divided circle outside the compass box, is provided with two verniers at right angles to the telescope and read to minutes. The tripod head is arranged with shifting centre, for setting the instruments quickly over a given point without the trouble of altering the position of the legs. The tripod legs are made of very strong mahogany.

No.		Price.
985.	Surveyor's Transit, with two verniers to limb, level under Telescope, vertical circle 4½ inches diameter, with clamp and tangent screw to axis of Telescope, needle 4 inches long,	$155.00
986.	Surveyor's Transit, same as No. 985, but without vertical circle to axis of Telescope,	143.00
987.	Surveyor's Transit, same as No. 985, but without level under Telescope and without vertical circle and clamp and tangent screw to axis of Telescope,	125.00
988.	Surveyor's Transit, same as No. 985, but with needle 5 or 5½ inches long,	160.00
989.	Surveyor's Transit, same as No. 988, but without vertical circle to axis of Telescope,	148.00
990.	Surveyor's Transit, same as No. 988, but without either level, vertical circle or clamp, and tangent screw to Telescope,	130.00
991.	Surveyor's Transit, with one vernier to limb, level under Telescope, vertical circle 4½ inches diameter, with clamp and tangent screw to axis of Telescope, needle 5 or 5½ inches long,	145.00
992.	Surveyor's Transit, same as No. 991, but without vertical circle,	133.00
993.	Surveyor's Transit, same as No. 991, but without either level, vertical or clamp, and tangent screw to Telescope,	115.00

The Surveyor's Transits, from No. 985 to 993, weigh about 13 lbs. each.

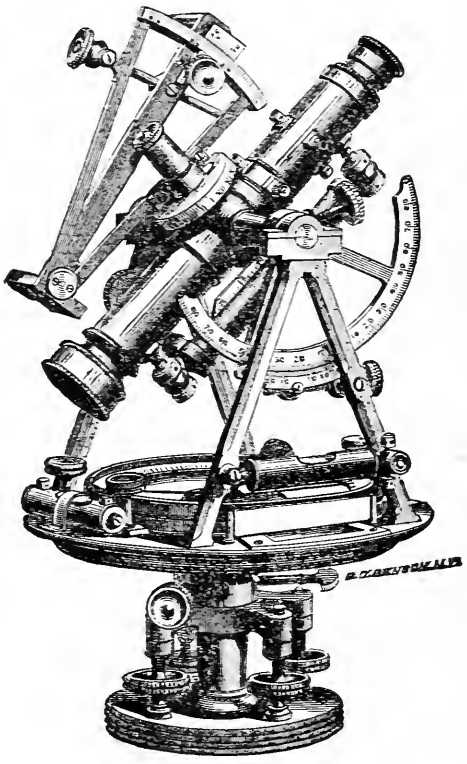
ENGINEER'S TRANSIT.

The description given on page 119 for the Surveyor's Transit will apply for the Engineer's Transit, excepting that the latter has the axis or centre running from the lower parallel plate of the tripod head to the centre plate of the instruments, thus securing greater accuracy for laying of angles. The upper part of the Transit does not separate from the tripod head, as in the Surveying Transit, but is permanently attached to the parallel plates and leveling screws, and when put in its box is unscrewed from the tripod at the lower parallel plate. See cut on first page of cover.

994.	Engineer's Transit, with two verniers to limb, level under Telescope, vertical circle 4½ inches diameter, with clamp and tangent screw to axis of Telescope, 4-inch needle,	$175.00
995.	Engineer's Transit, same as No. 994, but without vertical to axis of Telescope,	163.00
996.	Engineer's Transit, same as No. 994, but without either level, vertical circle or clamp and tangent screw to Telescope,	145.00
997.	Engineer's Transit, with two verniers to limb, level under Telescope, vertical circle and clamp and tangent screw to Telescope, needle 4½ or 5 inches long,	180.00
998.	Engineer's Transit, same as No. 997, but without vertical circle to axis of Telescope,	168.00
999.	Engineer's Transit, same as No. 997, but without either level under Telescope, vertical circle or clamp, and tangent screw to Telescope,	150.00

All the Transit Instruments from No. 978 to 999, inclusive, are furnished with handsome mahogany boxes.

LIGHT MINING OR MOUNTAIN TRANSITS.



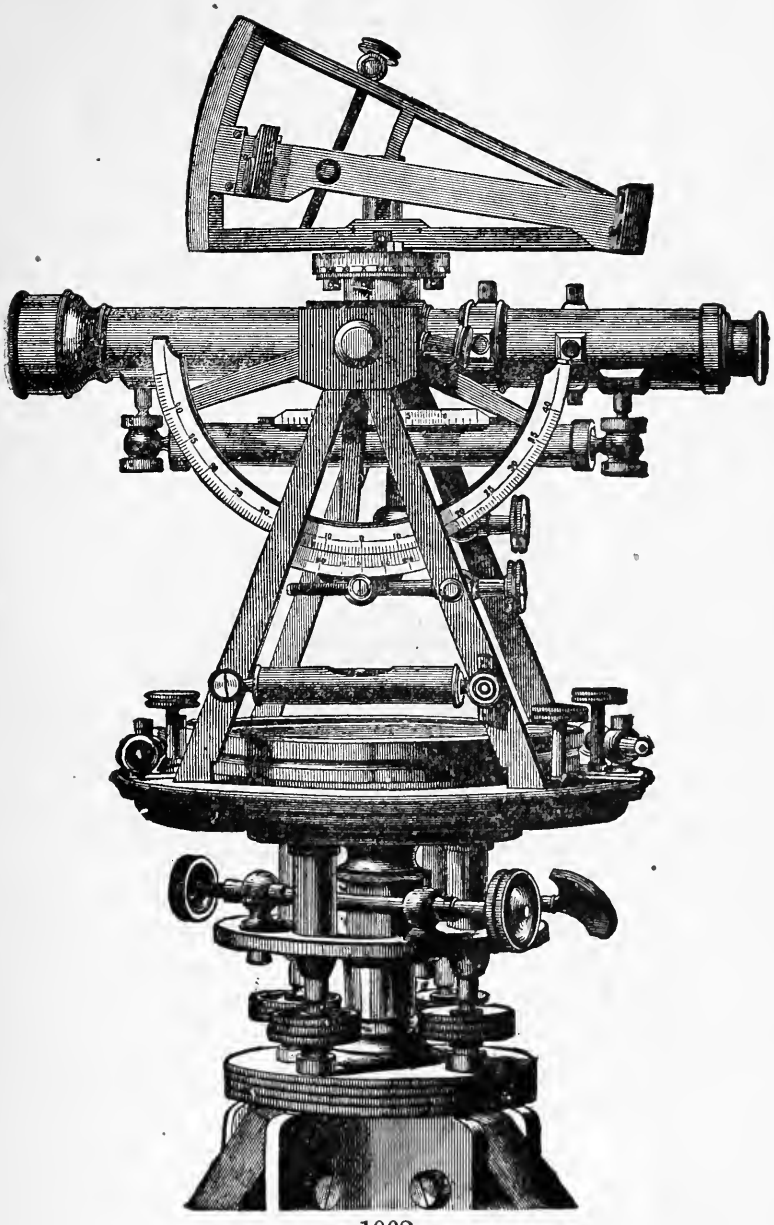
This is an extra light Engineer's Transit, for mine or mountain use, introduced by us to meet a demand for a light transit of the best quality. It has met with a very large sale and been universally approved. We confidently recommend it to all our friends as a transit of the first class, capable of any work, and specially adapted for mining or rough country use, where great portability is required.

PRICE.

No. 1. Light Mountain Transit, with 4-inch needle, vernier for setting off the magnetic variation, two opposite verniers to the limb reading to single minutes; 8-inch achromatic telescope of the finest quality, power 20 diameters, furnished with our patent extension tripod, shortening to half length for portability and low tunnel service. The instrument is packed in a light mahogany case, and this covered with a light sole-leather case, amply furnished with straps for "packing." With plain telescope, ... $150.00

No. 2. Same as above, but with level under telescope, vertical circle 4½ inches diameter, and clamps and tangent screw to axis of telescope, . . 180.00

No. 3. Light Mountain Transit, same in all respects as the above, but with the addition of our patent solar attachment; vertical arc on silver. level on telescope with ground bubble and scale, and clamp and tangent to axis of telescope, complete, as shown in frontispiece, . 245.00



1002.

SOLAR TRANSIT.

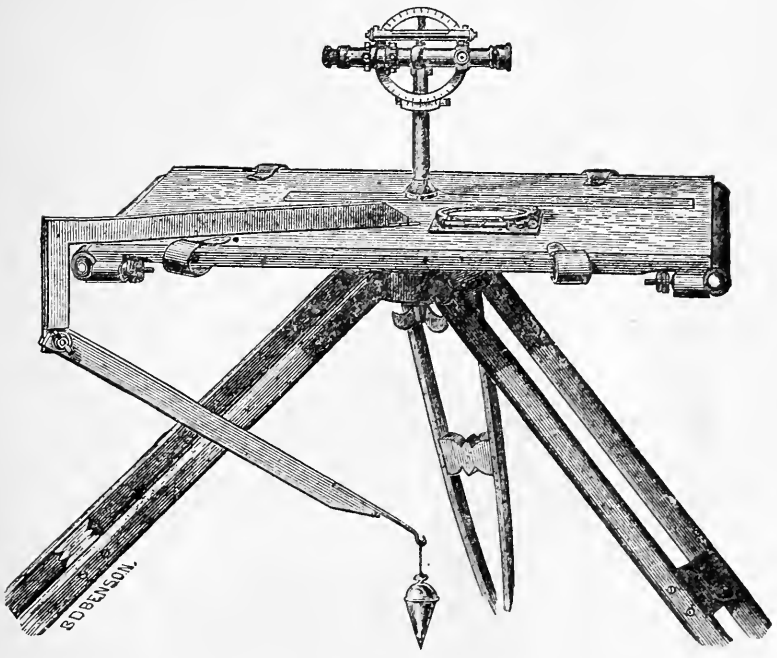
No.		Price.
1001.	Burt's Solar Compass, with Adjusting Socket and Leveling Tripod, .	$210.00
1002.	Solar Transit, with Tripod, ...	226.00
1003.	Patent Solar Attachment for Transits, ...	60.00
1004.	Vertical Arc divided on Silver, with Vernier reading to 30 seconds, with movable Tangent Screw, ...	18.00

POCKET SOLAR COMPASS.

1004½.

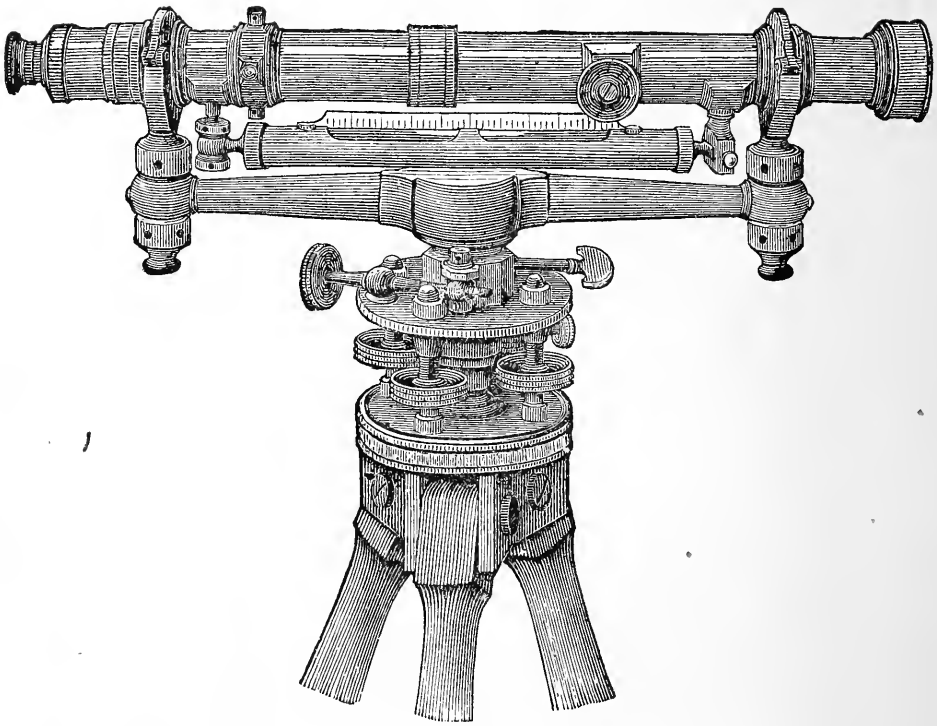
No.		Price.
1004½.	Pocket Solar Compass, complete with tripod and mahogany box,	$105.00

PLANE TABLES.



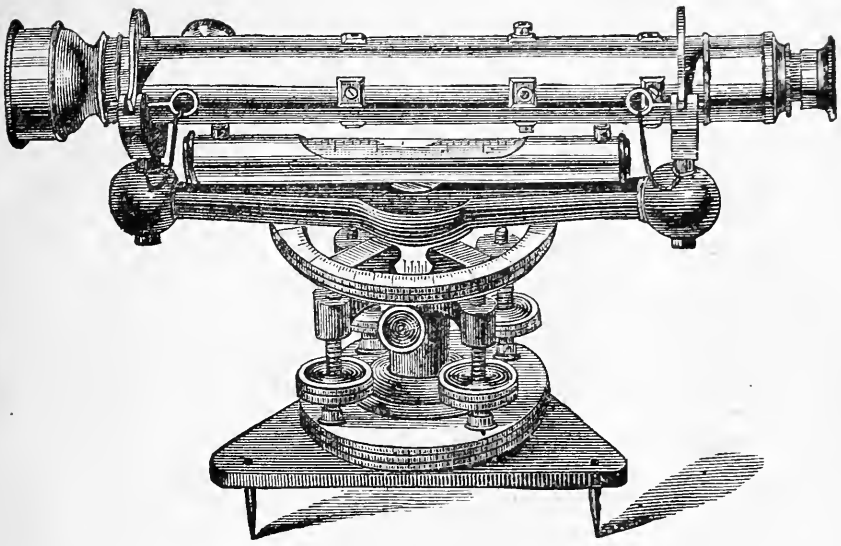
No.		Price.
1.	Plane Table, board 24x30 inches, mounted on large tripod, with leveling socket and clamp, and with plumbing-bar, plummet, and clasps for paper,	$45.00
	Combined compass and levels, with square base,	15.00
	Alidade with compass sights,	15.00
	Total,	$75.00
2.	Plane Table, with board, etc., same as No. 1,	$45.00
	Combined compass and levels,	15.00
	Alidade, same as No. 1, supplied with telescopic sight, with stadia, vertical circle to 5 minutes, level, and clamp and tangent,	50.00
	Total,	$110.00
3.	Plane Table, with board, etc., same as No. 1,	$45.00
	Combined compass and levels,	15.00
	Alidade with telescope 9 inches long, power 20 diameters, with stadia, vertical circle to 5 minutes, level on telescope, and clamp and tangent, mounted on column as in engraving,	70.00
	Total,	$130.00
4.	Plane Table, with board, etc., same as No. 1,	$45.00
	Combined Compass and levels,	15.00
	Alidade with telescope 11 inches long, with stadia, 4½-inch vertical circle on silver to 1 minute, level on telescope, and clamp and tangent, on column, power of telescope 24 diameters,	90.00
	Total,	$150.00
5.	Set of three leveling screws for any of the above-named Plane Tables, extra,	10.00
6.	Clamp and tangent, for movement in azimuth, extra,	5.00

ENGINEER'S LEVEL.



1005.

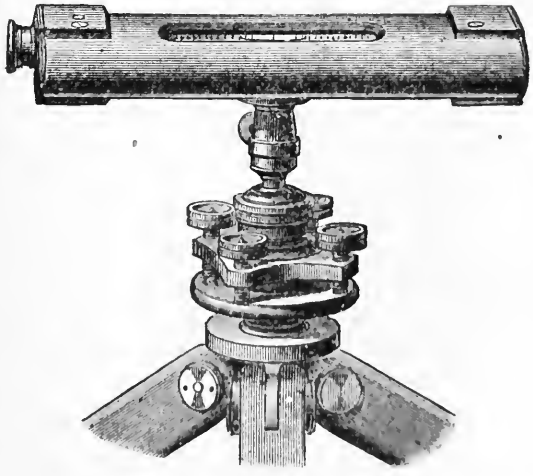
No.		Price.
1005.	Y Level of the most approved form and construction, with telescope either 16, 18, or 20 inches long. In this instrument the telescope is made to revolve readily and truly in the Ys by rings of bell-metal, which, when desired, may be firmly clamped by the clips, and held in any position. It has a rack-and-pinion movement to both object and eye-glasses, an adjustment for centering the eye-piece and another for insuring the accurate projection of the object-glass in a straight line. Both of these are completely concealed from observation and disturbance by a thin ring, which slides over them. The Ys of this level are made large and strong, of the best bell-metal, and each have two nuts, both being adjustable with the ordinary steel-pin. The level-bar is made round, of well-hammered brass, and shaped so as to possess the greatest strength in the parts most subject to sudden strains. The tripod-head has the same plates and leveling screws as that of the Engineer's Transit, ...	$110 00
1005½.	Same as 1005, but with telescope 22 inches long, ...	115.00
1106.	,, ,, ,, ,, ,, 15 ,, ,, ...	90.00



1009

No.		Price.
1009.	The Architect's Level, including tripod, plumb-bob, box, etc., . .	$50.00

The instrument represented in the cut is intended to meet a want long felt by every intelligent architect, builder, millwright, and agriculturist—of a simple, compact, and servicable level, procurable at a very moderate cost.



1009¾.

1009¼.	Farmer's or Drainage Level, with Jacob Staff mountings, .	.	.	15.00
1009½.	Do.	do.	do.	do.	plain tripod, ...	.	.	20.00
1009¾.	Do.	do.	do.	do.	tripod and leveling screws, .	.	25.00

NEW QUICK LEVELING TRIPOD HEAD.

PATENTED BY

W. & L. E. GURLEY, TROY, N. Y.

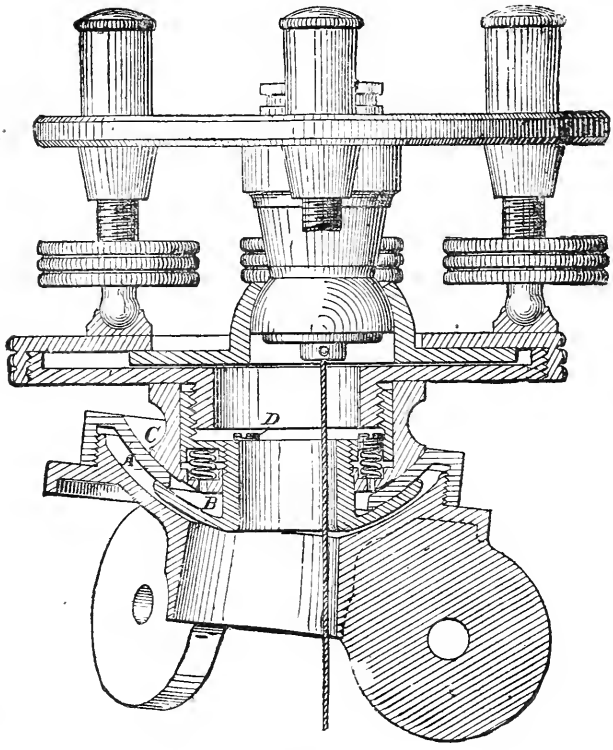


FIG. 1.

FIG. 1. Shows the quick leveling tripod head designed for level or transit, and without shifting plate.

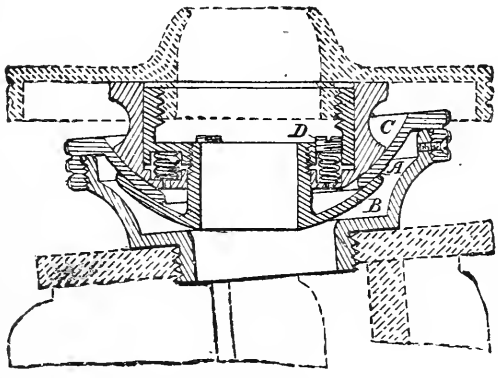


FIG. 2.

FIG. 2. Shows the quick leveling attachment as screwed fast to a tripod of any pattern now in use.

The following engravings represent a new tripod head for Engineers' and Surveyors' instruments, greatly facilitating the leveling of an instrument, and making, as we believe, the most efficient quick leveling arrangement yet devised.

DIRECTIONS FOR USE.

Screw the instrument on the tripod as usual; if not nearly level, unscrew the leveling head a very little, a bare loosening of the screw is sufficient. The instrument will then be free to move upon the spherical surfaces A, B, C, in any direction required to bring the plates approximately level, and will be held in this position by the friction of the same surfaces.

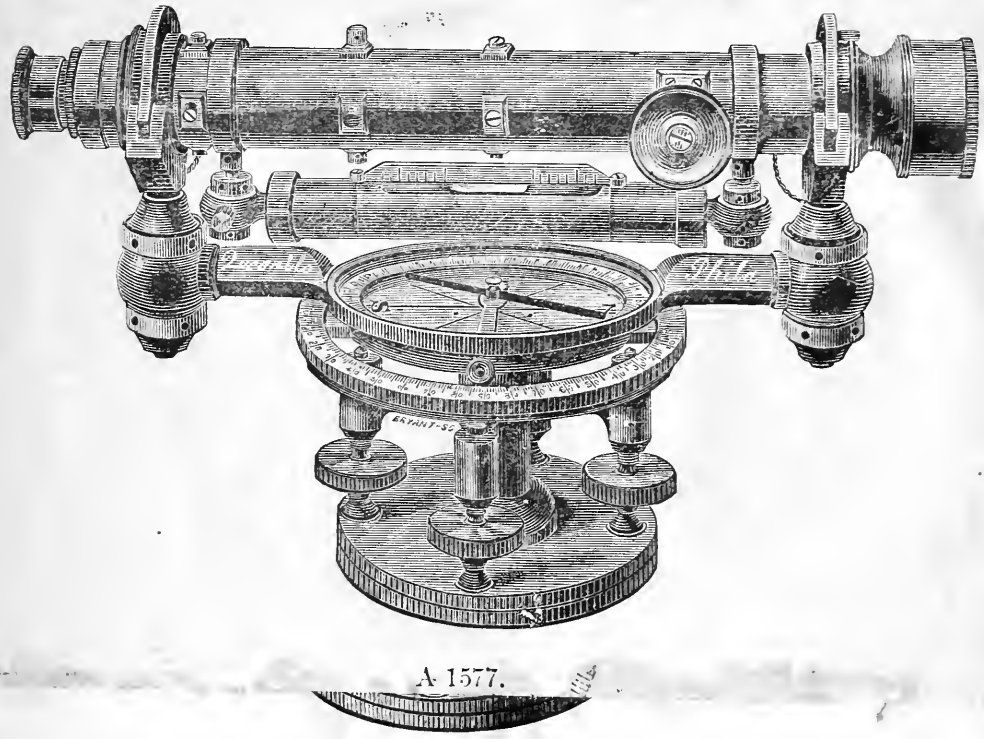
Now screw the head fast again, firmly clamping the whole instrument to the tripod. The final ajustment of the level is then completed by the use of the leveling screws.

The friction of the spherical surfaces may be increased or diminished at will, by turning the screws "D," which compresses the spiral springs.

PRICES.—As shown in Fig. 1, when furnished with a new instrument, $5.00. For same, adapted to any instrument already in use, as in Fig. 2, $7.50.

N. B.—When No. 2 is ordered for any instrument, the lower plate of the leveling head, as shown in outline of same figure, or the brass head of the tripod, the legs being removed, may be sent to us by mail or express, prepaid, with a remittance of, say $9, to pay for attachment and return charges.

THE ARCHITECT'S COMPASS LEVEL.



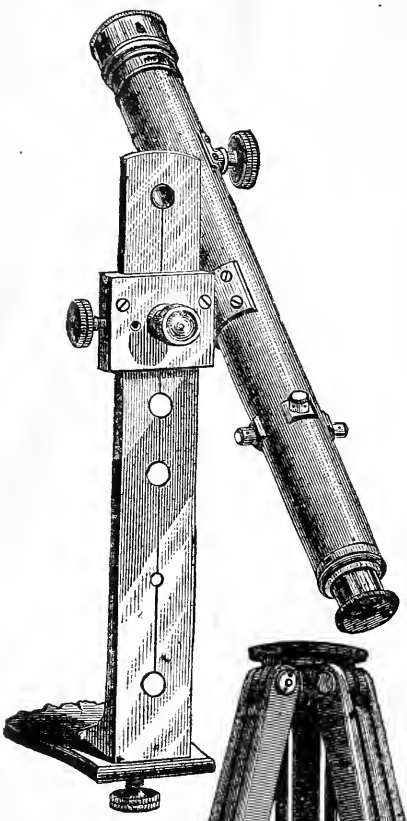
A 1577.

Architects' Compass Level, complete with tripod, ... $65.00

This new instrument which has only been before the public for about a year, has already met with great favor among Architects, Builders, Millwrights and among Engineers and Surveyors by whom it is used in city work.

The Telescope is 12 inches long and of the finest optical qualities, and is arranged and adjusted as in the regular engineer's level. It is furnished with a carefully ground, long level. The instrument turns upon a horizontal circle, 3-inch diameter, graduated from 0 to 90 each way, and is read to five minutes by a vernier which is fixed to the spindle. The compass has 3½-inch needle.

The instrument is packed in box with strap and is furnished with adjusting pins, &c.



977½.

977½. NEW TELESCOPIC SIGHT,

ATTACHABLE TO ANY COMPASS.

[PATENT APPLIED FOR.]

THE NEW TELESCOPIC SIGHT consists of a telescope furnished with the usual cross wires, etc., and attached to a movable band, which, as shown in the engraving, can be slipped over the sight of any compass, clamped at any point desired, and put in adjustment by a method so simple as to be within the reach of any person who has a screw-driver.

The surveyor can then use the telescope either in connection with the sights or entirely independent of them, running long lines, taking fore and back sights, and sighting up and down hills with perfect facility, and with an ease and accuracy surprising to one who has run lines only by the ordinary sights.

The New Telescopic Sight can be applied to any compass, and those ordering it need only to give us the width and thickness of the sight upon which it is to be placed to receive the apparatus, with full directions for its adjustment and use. It can also be detached when not in use, and replaced again without injuring its adjustments.

No. 1.—Nine-inch Achromatic Telescope, of low, but sufficient power, ... $12.00

No. 2.—Nine-inch Achromatic Telescope, larger diameter of object-glass and higher power, . . . 17.00

No. 3.—Same Telescope as No. 2, but furnished with micrometer or stadia wires for measuring distances, . 20.00

977¾.

977¾. PATENT EXTENSION TRIPOD,

To be used with any Instrument (in place of regular Tripod), extra, $5.00.

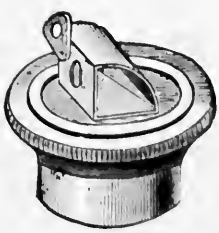
Price of Tripod complete , . . $15.00

Our new Patent Extension Tripod has all of its legs so made that they can be shortened or lengthened at will. It is thus perfectly fitted for use in hilly country, and is specially adapted for use in mines where a short tripod is needed.

REPAIRS TO ENGINEERING INSTRUMENTS.

We are prepared to repair promptly, reliably, and cheaply any instrument sent us, no matter by whom they may be manufactured, and while it is impossible, without making a thorough examination, to give the exact cost of needed repairs, a brief statement may aid our customers in determining the relative cost.

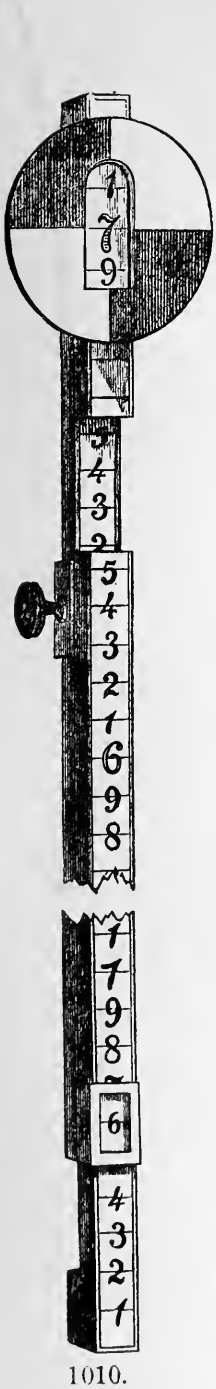
When shipping, pack the instrument in its case, and this should be inclosed in an outside packing-box, the space being filled up with loose packing material. Inclose a note mentioning the repairs desired, each instrument being made to fit its own spindle, this part with the parallel plates, or if it is a compass, the ball and socket mountings must be forwarded with the instrument. The tripod need not be sent.



EXTRAS TO TRANSITS.

	Price.
Patent Solar Attachment,	$60.00
Variation Plate furnished with new Engineers' Transit when ordered,	4.00
Do. do. added to any Engineers' Transit sent for repairs,	15.00
Plummet Lamp for mining engineering, hung in gimbals,	13.00
Diagonal Prism for Eye-piece,	8.00
Reflector for Object-glass of Transit Telescope,	4.00

	PRICE.
Vertical Circle, $3\frac{1}{2}$ inches diameter, divided on silver, vernier reading to five minutes,	$8.00
Vertical Circle, $4\frac{1}{2}$ inches diameter, divided on silver, reading to single minutes,	12.00
Vertical Arc, 6 inches diameter, divided on silver, with vernier, movable by tangent screw, reading to thirty seconds,	18.00
Clamp and Tangent Movement to axis of telescope,	6.00
Gradienter, combined with clamp and tangent,	18.00
Level on telescope, with ground bubble and scale,	12.00
Rack and Pinion Movement to eye-piece,	5.00
Sights on telescope, with folding joints,	8.00
Sights on standards at right angles to telescope,	8.00
Detachable Telescope for vertical sighting, either Fig. 10 or 11,	25.00
Graduations of limb on solid silver,	10.00
Do. do. to read to 20″ or 30″,	10.00
Do. do. to read to 10″,	30.00
Do. on $4\frac{1}{2}$-inch vertical circle, to read to 20″ or 30″,	5.00
Patent Extension Tripod,	15.00
Do. do. do. furnished instead of regular tripod, with any new instrument, extra,	5 00
Plain Tripod fitted to any Transit to order,	10.00
New Cross Wires,	3 00
Adjustable Stadia Hairs for telescope,	10.00
Plated Reflector for graduations,	4.00
Do. do. do. cross wires,	4.00
Needle and Centre-pin,	3.50
Ground-glass Level for telescope,	2.50
Do. do. do. plate,	.75
Cap for object-glass,	.75
Shade do.	.75
Variation Plate added to repaired Engineer's Transit,	15.00
Do. do. do. new do. do.	4.00
Regraduating Horizontal Limb and Vernier,	12.00
Do. Vertical do. do. do.	6.50
Repolishing Transit, either bright or bronze finish,	$15.00 to 20.00
Compass Sights, each,	3.50
Clamp Screw, for spindle or sights, each,	1.00
Mahogany Tripod Legs, per set,	6.00
Target for New York and Philadelphia rod,	5.50
Clamp for rod,	2.50
Jacob Staff Mountings for compass, complete,	5.00
Steel Shoe for staff,	.75
New Centre Pin,	1.00
Compass Glass,	50
Chamois Skin,	.50
Rubber Cover for transit or level,	1.00



1010.

1011.

1012.

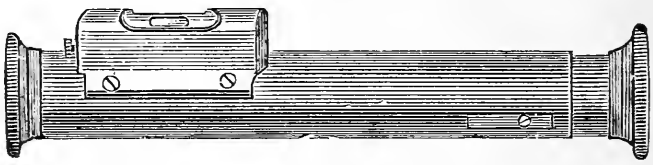
1012a.

1013.

No.		Price.
1010.	Philadelphia Leveling Rod, made of seasoned mahogany,	$16.00
1011.	New York do. do. do. do satin wood,	16.00
1012.	Boston do. do. do. seasoned mahogany,	16.00
1012*a*.	Architect's Rod, reading to inches and 16ths, . . .	6.00
1012*b*.	Metric Rod, ...	20.00
1012*c*.	Stadia Rod, ...	12.00
1012*d*.	English Rod, telescope pattern, ...	25.00
1013.	Ranging Poles, 6 feet long, with steel-pointed shoe, and divided off in feet, which are painted red and white, alternately, ...	2.50
1014.	Ranging Poles, 8 feet long, do. do. do.	2.75
1015.	Do. do. 10 do. do. do. do.	3.00

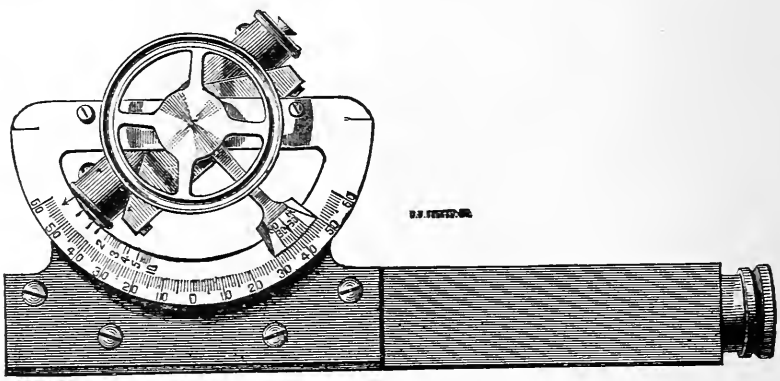
No.		Price.
1015½.	Steel Ranging Poles, 7 feet long, very accurate,	$6.25
1016.	Rod Level for Plumbing Rod or Pole,	5.00
1016½.	Plummet Lamps, for mining use, with Compensating Ring,	13.00
	Pair in box, with Strap,	28.00
1016¾.	Lamp for Mining Engineers, of copper, with Air Chamber, can be used on hat, in hand, or on table,	3.00

HAND LEVELS.



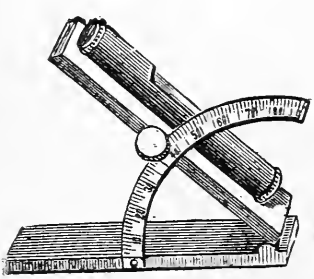
1017.

1017.	Locke's Hand Level, made of German Silver,				10.00
1018.	Do.	do.	do.	Brass,	9.00

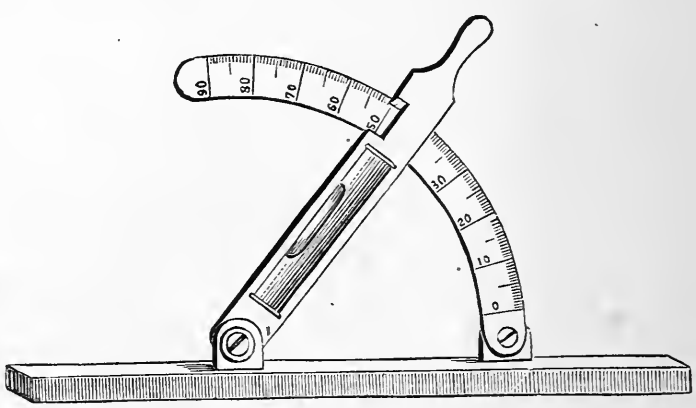


ABNEY LEVEL AND CLINOMETER.

1018½.	Combines the "Locke Hand Level" with the Clinometer, giving angles of elevation and slopes, in wood box,	15.00
1018¾.	Reflecting Hand Mirror, for turning right angles,	7.50

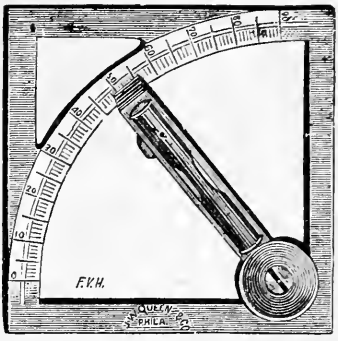


1019.



1020.

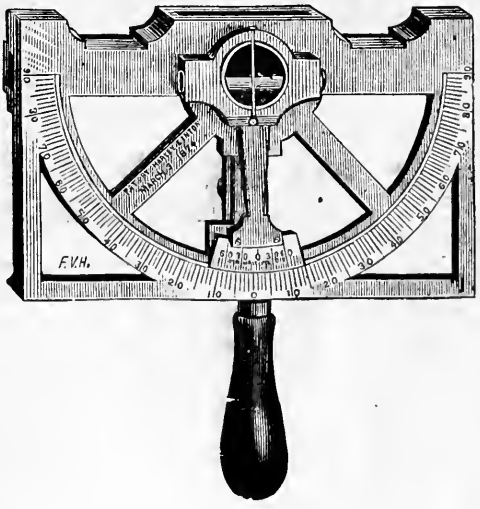
1019.	Clinometer or slope Level, small size, in morocco box,				8.00
1020.	Do.	do.	large do.	do.	12.00
1021.	Do.	do.	do.	with perpendicular sights,	15.00



1021½.

No.		Price.
1021½.	Clinometer, Square Frame, with arc running diagonally across, in box,	$12.00

This last form gives these instruments great firmness, and either of the four sides can be used for ascertaining the slope, thus enabling one to take the inclination of the under side of a plane.



1021¾.

1021¾.	Linton's Patent Combined Hand Level and Clinometer,	$20.00
1022.	Pocket Levels, mounted in brass, 3 inches long,	.70

1022.

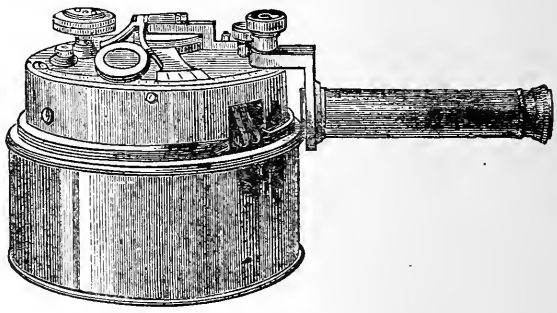
1023.	Pocket Levels, mounted in brass, 6 inches long,	1.50
1024.	Do. do. do. 9 do.	2.25
1025.	Do. do. do. 12 do.	3.00
1026.	Ground Level Bulbs, 2 to 6 inches long, each from	.50 to 2.50
1027.	Unground do. do. do. do.	.12 to .50
1027½.	Round Pocket Level, in case, mounted in brass, 2¾ inches in diameter,	2 00

Very delicate Ground Levels mounted to order.

CHAPTER XIII.

POCKET SEXTANTS, ODOMETERS, CHAINS, TAPE MEASURES, AND POCKET RULES.

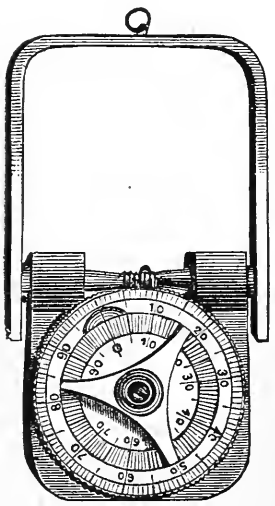
1028.



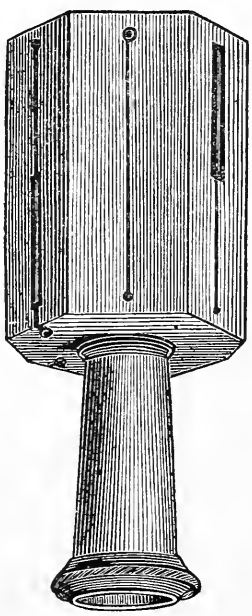
1030.

No.		Price.
1028.	Pedometer, an instrument for measuring distances walked, watch form and size, nickel-plated case,	$5.00
1029.	Pedometer, do. do. do. two dials,	7.50
1030.	Pocket Sextant with Telescope, very accurate,	50.00
1031.	Odometer, for measuring distances traveled by a carriage,	20.00
1031½.	Surveyor's Cross, for turning right angles,	3.00

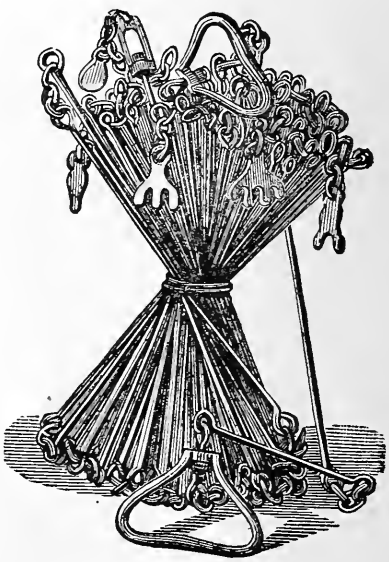
SURVEYOR'S AND ENGINEER'S CHAINS.



1031.



1031½.



1032.

1032.	Surveyor's Chain,	2 poles,	50 links,	No. 9,	wire oval rings,		2.00
1033.	Do.	2 do.	40 do.	do. 8,	do.		2.75
1034.	Do.	2 do.	50 do.	do. 8,	do.		2.75
1035.	Do.	2 do.	50 do.	do. 7,	do.		3.75
1036.	Do.	4 do.	100 do.	do. 9,	wire round rings,		3.50

NO.							PRICE.
1037.	Surveyor's Chain,	4 poles,	100 links,	No. 8,	wire oval rings,	. .	$4.50
1038.	Do.	4 do.	100 do.	7,	do.	. .	5.50
1039.	Do.	4 do.	100 do.	12,	best steel wire, brazed links and rings,	. .	10.00
1040.	Do.	2 do.	50 do.	12,	best steel wire, brazed links and rings,	. .	5.50
1041.	Engineer's Chain,	50 feet,	50 do.	7,	wire,	. . . .	4.00
1042.	Do.	100 do.	100 do.	7,	do.	. . . .	6.00
1043.	Do.	50 do.	50 do.	12,	best steel wire, brazed links and rings,	. .	6.00
1044.	Do.	100 do.	100 do.	12,	best steel wire, brazed links and rings,		11.50

GRUMMAN'S SPANISH VARA AND FRENCH METRE CHAINS.

1045. 66 feet, No. 15 Tempered Steel Wire, 100 links, weight 1¼ lbs., with 10 extra links, ... 9.00

1046. 33 feet, No. 15 Tempered Steel Wire, 50 links, weight ¾ lbs., with 5 extra links, ... 5.00

1047. 100 feet, No. 15 Tempered Steel Wire, 200 links, weight 2 lbs., with 15 extra links, ... 11.50

1048. 50 feet, No. 15 Tempered Steel Wire, 100 links, weight 1 lb., with 10 extra links, ... 6.00

1049.	33 feet,	No. 12 Wire,	5 tallies,	with 5 extra links,	weight 1 1/16 lbs.,					5.50
1050.	66 do.	12 do.	10 do.	10 do.	do.	3 do.				10.00
1051.	50 do.	12 do.	5 do.	5 do	do.	2⅛ do.				6.00
1052.	100 do.	12 do.	10 do.	10 do.	do.	4⅛ do.				11.50

1053. Spring Balance to use with either of the above-named chains, . . 2.00

1054. 50 feet, No. 18 Tempered Steel Wire, 100 links, no rings, with attachments of spring-balance, level, and thermometer, for very accurate measurements, weight ¾ lbs., ... 15.00

1054⅛. 10 varas, 50 links, No. 8 Refined Iron Wire, each, ... 2.50

1054¼. 20 do. 100 do. No. 8 do. do. 4.00

1054½. 10 do. 50 do. brazed links and rings, No. 12 Steel Wire, tempered, ... 5.50

1054¾. 20 varas, 50 links, brazed links and rings, No. 12 Steel Wire, tempered, ... 10.00

Metric Chains, 10 or 20 metres, same prices as those in varas.

1055. Set of 10 Marking Pins, very light, with leather case, . . . 2.00

1056. Brass Plummet, to use with light chain, ... 2.00

1057. Lead do. do. 1.50

1057½. Marking Pins of No. 8 steel wire, 11 in a set, per set, . . . 1.00

1057¾. Do. do. 7 iron do. 11 do. do. 75

1058.

1060.

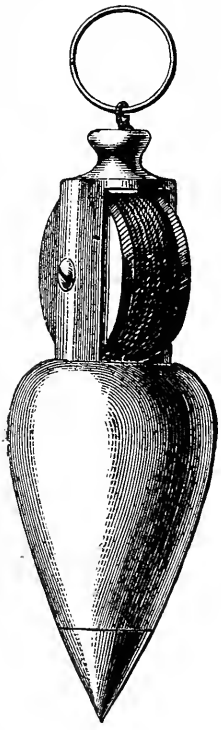
1058. Marking Pins, of No. 6 steel wire, 11 in a set, per set, ... 2.00

1059. Marking Pins, of tempered steel, 15 in. long, ¾ in. wide, 11 in a set, per set, ... 7.50

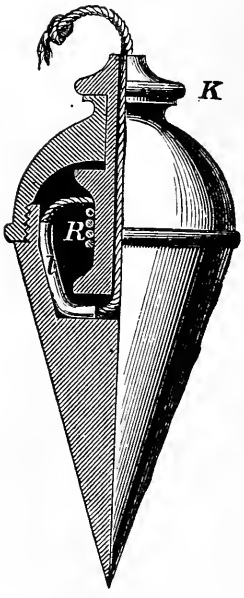
1060. Plumbob, of brass, with steel point and screw top, ... 2.50

1061. Same as No. 1060, but all steel, ... 2.50

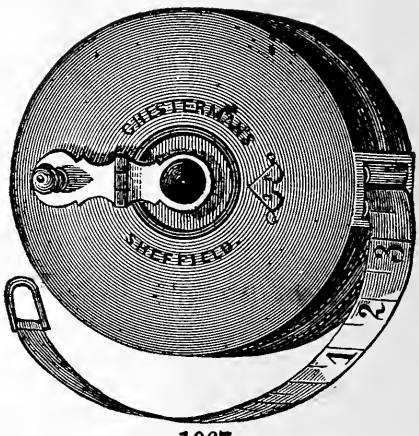
1062. Plumbob cord, per yard, ...06



1061½.



1063.



1067.

1061½. Patent Adjustable Plumb-bobs (small), 8 oz., ... $1.75
1061¾. Do. do. (large), 13 oz., ... 2.25

Nos. 1061½ and 1061¾ are constructed with a reel at the upper end, upon which the line may be kept, and by dropping the bob with a slight jerk, while the ring is held in the hand, any length of line may be reeled off. A spring, which has a bearing on the reel, will check and hold the bob firmly at any point on the line.

1063 has a concealed reel, around which the string is wound by turning the milled head on top. The friction upon the reel within will hold the bob at any desired point of the line, ... 2.50

TAPE MEASURES.

1065. Best Linen Tape Measure, in strong leather case, 50 feet long, each, . 1.50
1066. Do. do. do. do. do. 100 do. do. . 2.50

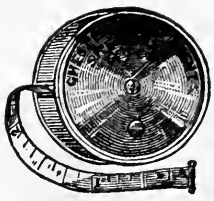
CHESTERMAN'S METALLIC TAPE MEASURES.

These tapes are made of linen thread interwoven with fine brass wire, not so liable to stretch as the usual linen tape, and better calculated to withstand the effect of moisture. They are in substantial leather cases.

1067. Metallic Tape Measure, 24 feet long, in 10ths or 12ths, each, . . 1.80
1068. Do. do. 33 do. do. do. do. . . 2.10
1069. Do. do. 40 do. do. do. do. . . 2.25
1070. Do. do. 50 do. do. do. do. . . 2.50
1070½. Same as 1070, but in case with Flush Handle, ... 3.25
1071. Metallic Tape Measure, 66 feet long, in 10ths or 12ths, each, . . 3.00
1072. Do. do. 70 do. do. do. do. . . 3.25
1073. Do. do. 75 do. do. do. do. . . 3.50
1074. Do. do. 80 do. do. do. do. . . 4.00
1075. Do. do. 100 do. do. do. do. . . 4.50
1075½. Same as 1075, but in case with Flush Handle, ... 5.00
1075¾*a*. Metallic Tape Measure, 50 feet long, divided in centimeters and meters on one side, and 10ths of a foot on the other, each, . . 3.75
1075¾*b*. Same as 1075¾*a*, but 100 feet in length, each, ... 6.00

Chesterman's Metallic Tapes furnished without boxes at the following prices: 50 feet, each, $1.75; 66 feet, $2.25; 100 feet, $3.25.

1076.



1085.

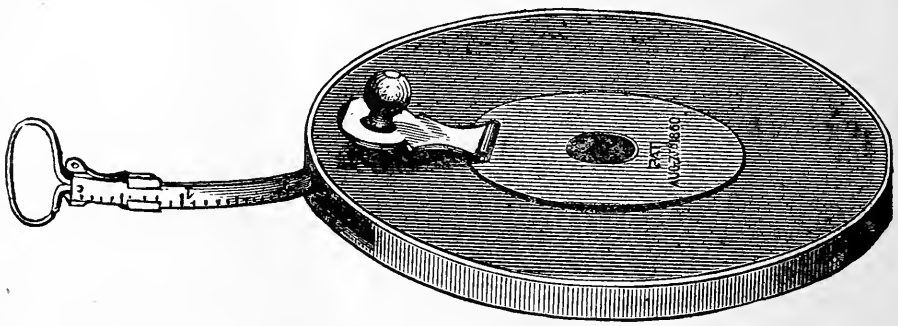
CHESTERMAN'S STEEL TAPE MEASURES.

Steel Tape Measures; all steel, to wind up in a box, same as linen measures, the most accurate, durable, and portable measures.

No.		PRICE.
1076.	Steel Tape Measure, 10 feet long, in 10ths or 12ths, in German silver case, each,	$3.25
1077.	Steel Tape Measure, 10 feet long, tape divided on one side to 12ths, and on the other to centimeters and millimeters,	3.50
1078.	Steel Tape Measure, 25 feet long, in 10ths or 12ths, each,	5.00
1079.	Do. do. 33 do. do. do. do.	5.75
1080.	Do. do. 40 do. do. do. do.	6.75
1081.	Do. do. 50 do. do. do. do.	7.00
1081½.	Same as 1081, but extra wide and heavy,	13.00
1082.	Steel Tape Measure, 66 feet long, in 10ths or 12ths, each,	9.00
1083.	Do. do. 75 do. do. do. do.	11.00
1084.	Do. do. 100 do. do. do. do.	14.00
1084½.	Steel Standard Measures, from 100 to 1000 feet, with graduations at every 50 feet:	
	Tape 100 feet, with Reel, Handle, and Stop,	10.50
	Each additional 100 feet,	5.50
	Large Brass Handles, to unship, each,	1.50
	Clamping Handle, each,	1.80
	Small Brass Clamp, to fasten on tape,	.75
	Every extra graduation and figuring, each,	.25
	The above tapes are made without joints and of precise U. S. standard; usually made about 300 feet in length, with graduations at every 10 feet, the last 10 feet with graduations at every foot, and the last foot into 10ths.	
1084¾*a*.	Steel Tape Measure, 50 feet long, divided into 10ths of a foot on one side, and millimeters and meters on the reverse side, each,	8.50
1084¾*b*.	Steel Tape Measure, 100 feet long, divided in 10ths and meters, each,	16.00
1084¾*c*.	Do. do. 20 meters long, divided in millimeters and meters, each,	9.00
1085.	Steel Tape Measure, 3 feet long, in German silver case, with spring and stop, tape divided into 10ths or 12ths of a foot,	1.50
1086.	Steel Tape Measure, 4 feet long, in German silver case, with spring and stop, tape divided into 10ths or 12ths of a foot,	2.00
1087.	Steel Tape Measure, 5 feet long, in German silver case, with spring and stop, tape divided into 10ths or 12ths of a foot,	2.25
1088.	Steel Tape Measure, 6 feet long, in German silver case, with spring and stop, tape divided into 10ths or 12ths of a foot,	2.50
1089.	Steel Tape Measure, 3 feet long, tape divided on one side to 12ths of a foot, and the other side to centimeters and millimeters,	1.75
1090.	Steel Tape Measure, 4 feet long, tape divided on one side to 12ths of a foot, and the other side to centimeters and millimeters,	2.25

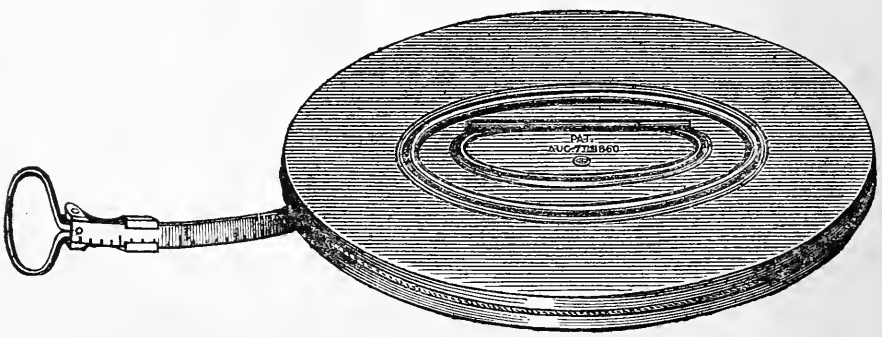
No.		Price.
1091.	Steel Tape Measure, 5 feet long, tape divided on one side to 12ths of a foot, and the other side to centimeters and millimeters,	$2.50
1092.	Steel Tape Measure, 6 feet long, tape divided on one side to 12ths of a foot, and the other side to centimeters and millimeters,	2.75
1093.	Linen Tape Measure, 3 feet long, in silver-plated cases, with spring and stop,	.50
1094.	Linen Tape Measure, 5 feet long, in silver-plated cases, with spring and stop,	.75
1095.	Linen Tape Measure, 6 feet long, in silver-plated cases, with spring and stop,	1.00

PAINE'S PATENT STANDARD STEEL TAPES.



1096.

1096.	Standard Steel Tapes, in japanned case, 25 feet long, 10ths or 12ths,						3.50
	Do.	do.	do.	33	do.	do.	do. 4.50
	Do.	do.	do.	50	do.	do.	do. 6.00
	Do.	do.	do.	66	do.	do.	do. 8.00
	Do.	do.	do.	75	do.	do.	do. 10.00
	Do.	do.	do.	100	do.	do.	do. 12.00



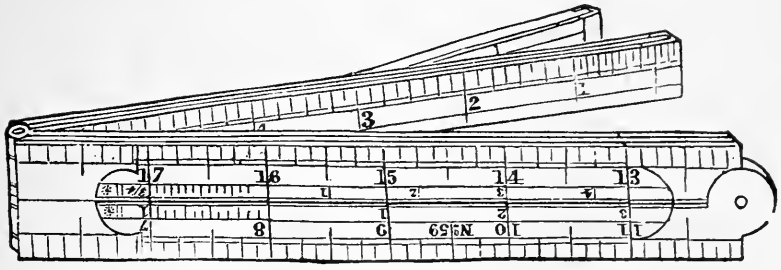
1097.

1097.	Steel Tape Measure, in leather case, flush handles, 33 ft. long, 10ths or 12ths,							5.50
	Do.	do.	do.	do.	50	do.	do.	do. 8.00
	Do.	do.	do.	do.	66	do.	do.	do. 10.00
	Do.	do.	do.	do.	75	do.	do.	do. 12.00
	Do.	do.	do.	do.	100	do.	do.	do. 15.00

EXTRAS TO PAINE'S PATENT STANDARD STEEL TAPES.

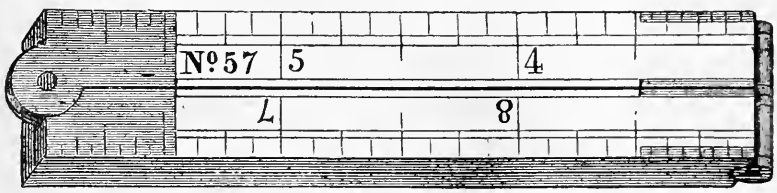
1098.	Handles, with graduated scale, per pair,	4.50
1099.	Pocket Thermometers,	1.50
1099½.	Spring Balance and Level,	5.00

POCKET RULES.



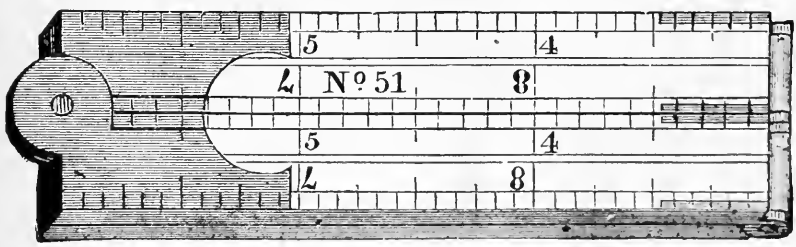
1100.

No.		Price.
1100.	One Foot, four Fold, boxwood, each, ...	$0.25
1101.	Do. do. do. brass edges, bound, . . .	.75



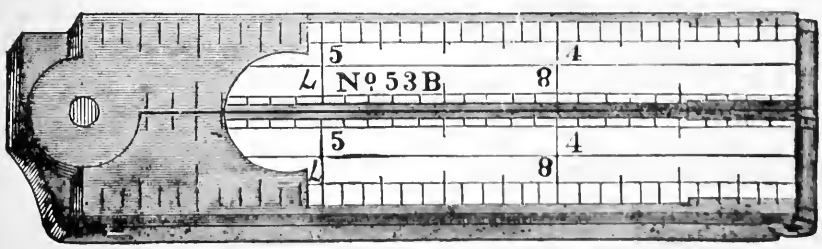
1102.

1102.	One Foot, four Fold, ivory, brass mounted, ...	1.00
1103.	Do. do. do. German silver mounted, . . .	1.25



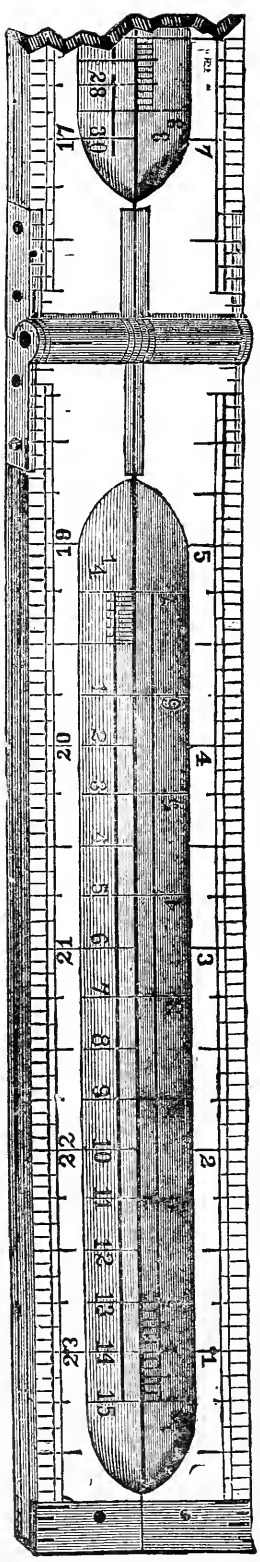
1105.

1104.	One Foot, four Fold, ivory, German silver mounted, graduated in 8ths, 10ths, 12ths, 16ths, and 100ths of a foot on edges of unbound, . .	2.25
1105.	One Foot, four Fold, ivory, graduated in 8ths, 10ths, 12ths, and 16ths, with German silver edges, bound, ...	3.00

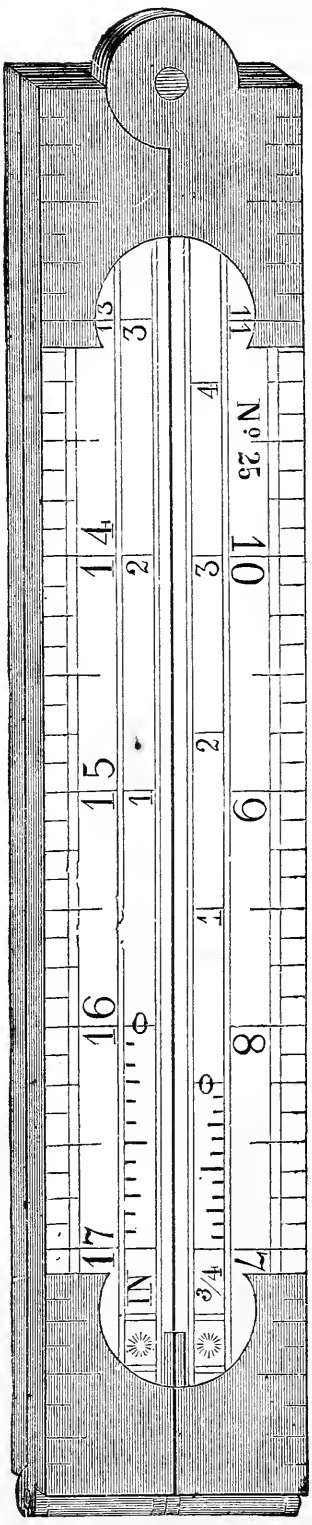


1106.

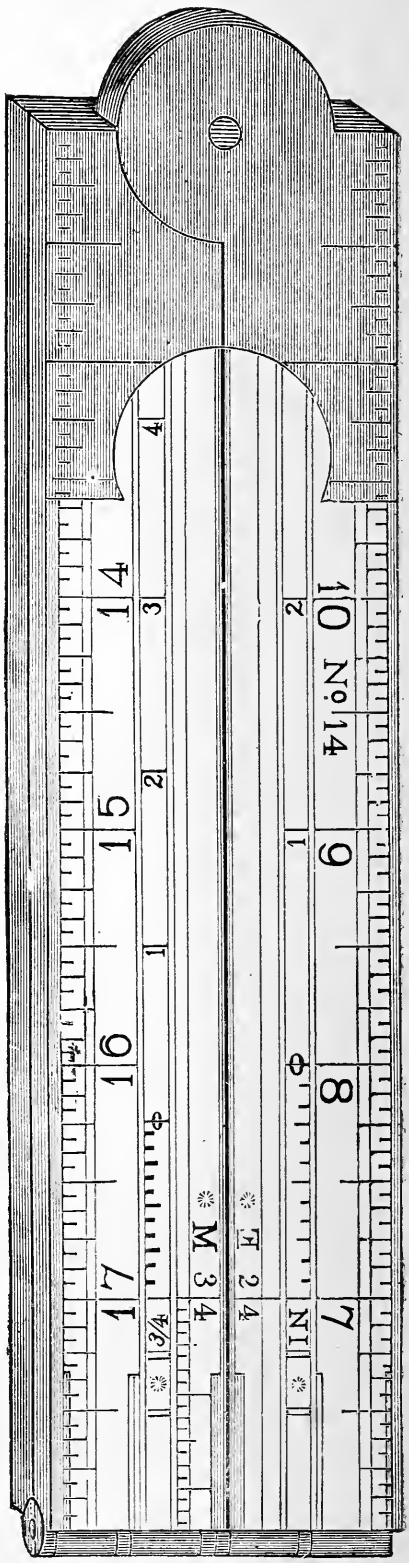
1106.	One Foot, four Fold, ivory, Caliper, graduated in 8ths, 10ths, 12ths, and 16ths, ...	3.00
1107.	One Foot, four Fold, ivory, Caliper, graduated in 8ths, 10ths, 12ths, and 16ths, with German silver edges, bound, ...	4.00
1108.	Two Feet, four Fold, boxwood, inside edges beveled with Drafting Scales, ...	1.00



1108.

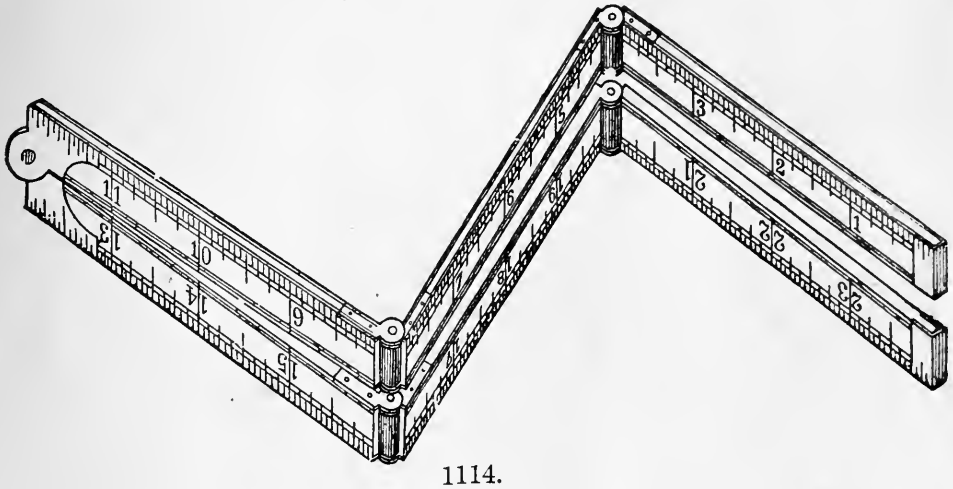


1111.



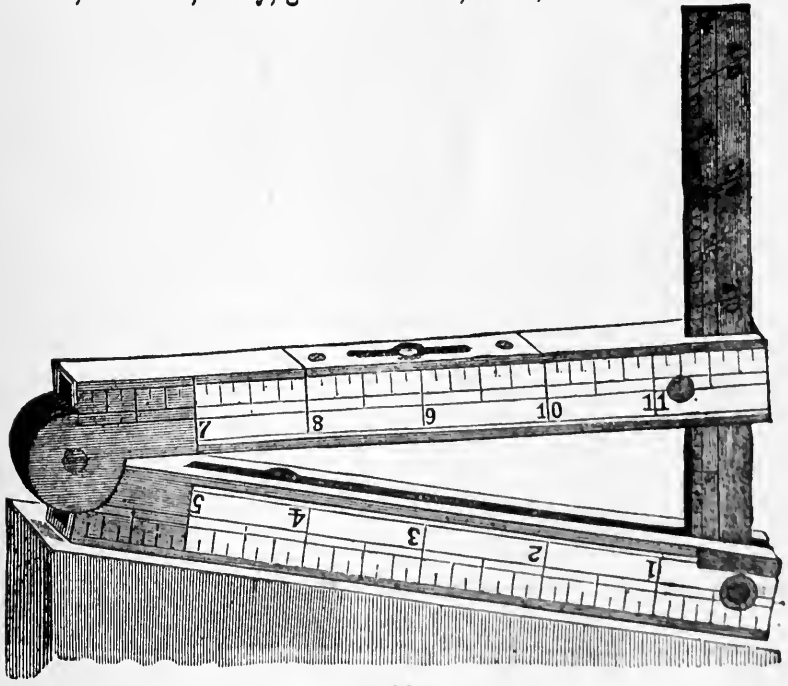
1112.

No.		Price.
1109.	Two Feet, four Fold, boxwood,	$0.30
1110.	Do. do. do. brass bound, with Drafting Scales,	1.00
1111.	Do. do. ivory, German silver mounted, with 8ths, 10ths, and 16ths inches, and $\frac{1}{4}$, $\frac{1}{8}$, $\frac{3}{4}$, and 1 inch Drafting Scales,	6.00
1112.	Two Feet, four Fold, ivory, same as No. 1111, German silver, bound,	7.50
1113.	Do. do. do. do. do. but extra broad and bound in German silver,	9.00



1114.

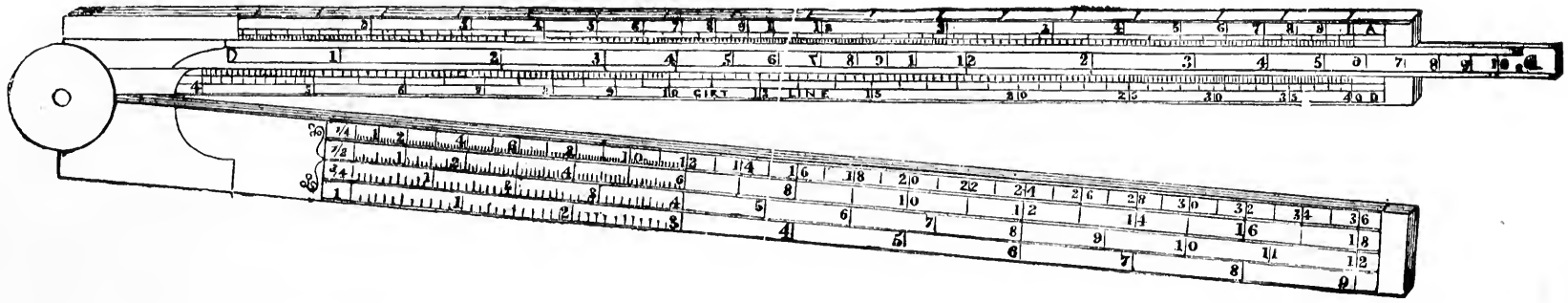
1114.	Two Feet, six Fold, boxwood, graduated 8ths, 10ths, 100ths, and 16ths,	1.25
1115.	Two Feet, six Fold, ivory, graduated 8ths, 10ths, and 16ths inches,	6.00



1116.

1116. Combination Rule, One Foot, two Fold, boxwood. This is the most convenient and useful pocket-rule ever made; it combines in itself a Carpenter's Rule, Spirit Level, Square Plumb, Bevel, Indicator Brace, Scale, Draughting Scale of equal parts, T Square, Protractor, Right-angle Triangle, and with a straight edge can be used as a Parallel Ruler, all the parts of which, in their separate applications, are perfectly reliable, 2.50

An explanation and directions for use accompanies each of the Combination Rules.



No.		Price.
1117.	Two Feet, two Folds, boxwood Slide Rule, Gunter's,	$1.25

1117½. Treatise on the Gunter's Slide and Engineer's Rules, showing their utility, and containing full and complete instructions, enabling mechanics to make their own calculations. It is also particularly adapted to the use of persons having charge of cotton or woolen machinery, surveyors, and others. 200 pages, bound in cloth.

Price, $1.00, net. *Sent by mail, post-paid, on receipt of price.*

VERY ACCURATE

Pocket Aneroid Barometers.

Compensated and Specially Tested and Adjusted for Engineers' Use.

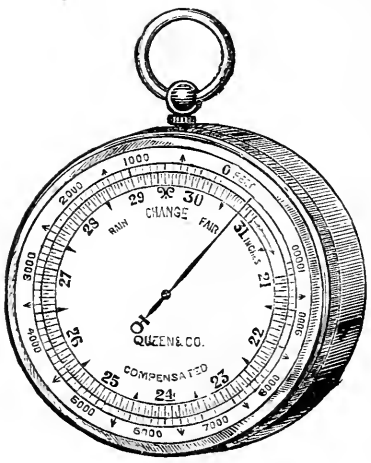
These Aneroids have movable altitude scales, with silver enameled dials, and are in morocco cases.

13500

13505

13500.	PLAIN POCKET ANEROID,			$1\frac{3}{4}$ in. diameter,	$15 00
13501.	Do.	do.	do.	$2\frac{1}{2}$ in.	17 00
13502.	Do.	do.	do.	$1\frac{3}{4}$ in. diameter, with thermometer,	20 00
13503.	Do.	do.	do.	$3\frac{1}{2}$ in. do. do.	21 00
13505.	POCKET MOUNTAIN ANEROID, compensated for temperature, $1\frac{3}{4}$ in. diameter, with altitude scale to 3000 feet,				20 00
13506.	Do.	do.	do.	5000 feet,	20 00
13507.	Do.	do.	do.	10,000 "	21 00
13508.	Do.	do.	do.	15,000 "	24 00
13509.	Do.	do.	do.	20,000 "	27 00
13510.	POCKET MOUNTAIN ANEROID, compensated for temperature, same as 13505, $2\frac{1}{2}$ inches diameter, with altitude scale to 3000 feet,				20 00
13511.	Do.	do.	do.	5000 feet,	20 00
13512.	Do.	do.	do.	10,000 "	21 00
13513.	Do.	do.	do.	15,000 "	24 00
13514.	Do	do.	do.	20,000 "	27 00

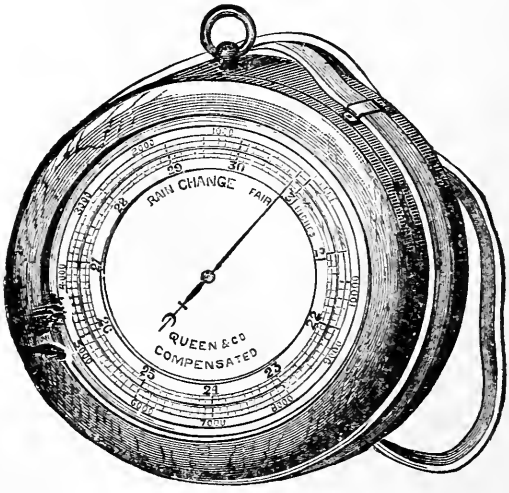
GEOLOGICAL ANEROIDS.



13515.
Front.

13515.
Back.

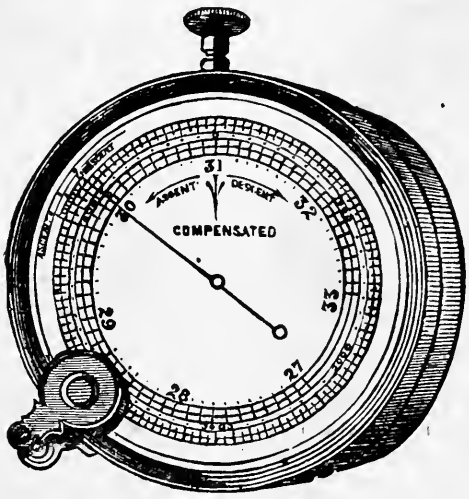
13515. GEOLOGICAL ANEROID, compensated for temperature, silvered metal dial, with needle compass at back, 2½ inches diameter, in leather sling case, with altitude scale to 5000 feet, ... $30 00
13516. Do. do. 10,000 feet, ... 31 00
13517. Do. do. 15,000 " 33 50



13520.

13520. GEOLOGICAL ANEROID, compensated for temperature, with silvered metal dial, 5 in. diameter, in mahogany open face case, with leather strap, with altitude scale to 3,000 feet, ... 33 00
13521. Do. do. 5,000 " 33 00
13522. Do. do. 10,000 " 35 00
13523. Do. do. 15,000 " 37 00
13524. Do. do. with thermometer, altitude scale to 3000 feet 35 00
13525. Do. do. 5,000 feet, ... 35 00
13526. Do. do. 10,000 " 37 00
13527. Do. do. 15,000 " 39 00

SURVEYING AND MINING ANEROIDS.



13530.

13530. SURVEYING ANEROID, 5 in. diameter, compensated for temperature, silvered metal dial, graduated to hundredths, and reading by vernier to single feet, with magnifier, in leather sling case, with altitude scale to 5,000 feet, ... $50 00

13531. Do do 10,000 feet, ... 55 00

13532. Do do 15,000 " 60 00

13534. MINING ANEROID, same as 13530, but arranged to register 2,000 feet below sea level to 4,000 above 50 00

THE SURVEYING AND MINING ANEROID has been designed and constructed specially for the use of Surveyors and Engineers, for the purpose of readily ascertaining slight variations in gradients, levels, &c., and from its extreme sensitiveness will be found of considerable utility in Mining and Surveying work generally.

Besides extreme sensitiveness, the specialty claimed for this Instrument is an arrangement of the Scale of Altitudes which admits of subdivision by a Vernier, hitherto impracticable, owing to the Altitude Scale in ordinary use being a gradually diminishing one, to which a Vernier cannot be applied. In the present Instrument the action has been so adjusted as to give accurate readings upon a regular Scale of Altitudes, the Barometrical Scale of Inches having been made progressive so as to afford the correct relative readings with the Scale of Altitudes.

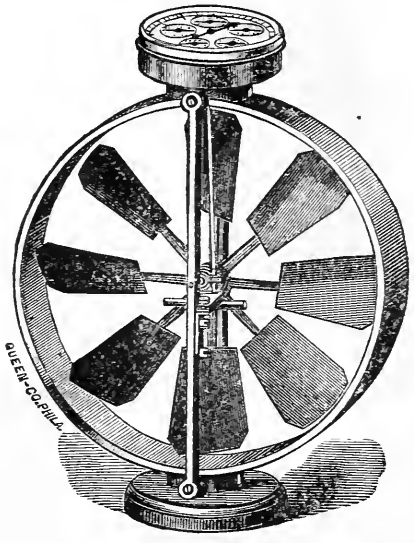
For Mining purposes the entire circle of the dial is graduated to represent 6 inches of the mercurial column, *i.e.*, from 27 inches to 33. This scale will register about 2000 feet *below* sea-level to 4000 feet *above;* the finest divisions, hundredths of the Altitude Scale, represent 10 feet measurements, which can be again subdivided by the Vernier Scale to *single feet.* The Vernier Scale is moved by a rack-work adjustment, and a magnifying lens which rotates on the outer circumference of the Instrument facilitates the reading of minute quantities.

For Surface Surveying purposes, where it is not required to be used *below* sea-level, the Instrument is made with the scale divided from 25 to 31 inches, thus giving an Altitude Scale of 5000 feet above sea-level only, and with this open scale and the assistance of the Vernier, the same minute readings can be easily taken.

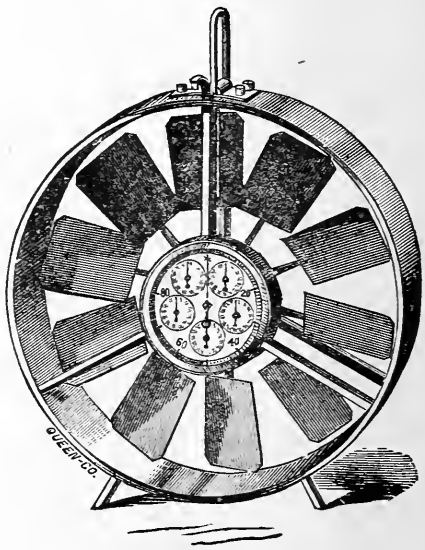
ANEMOMETERS.

For Measuring the Velocity of Currents of Air in Coal Mines, and Ventilators, Flues, etc., of Public Buildings.

The Anemometer, an instrument invented for the purpose of measuring the rate at which air moves in mines and ventilation passages, is now an indispensable adjunct of the former, the mining laws of most States requiring that a certain number of cubic feet of air shall be passed to the air-ways, and the Anemometer furnishing the most convenient and satisfactory mode by which the amount of air passing can be determined.

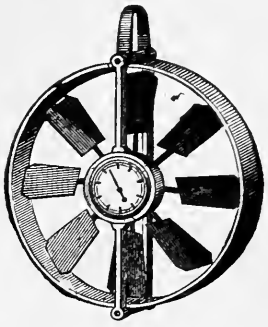


No. 14,500.



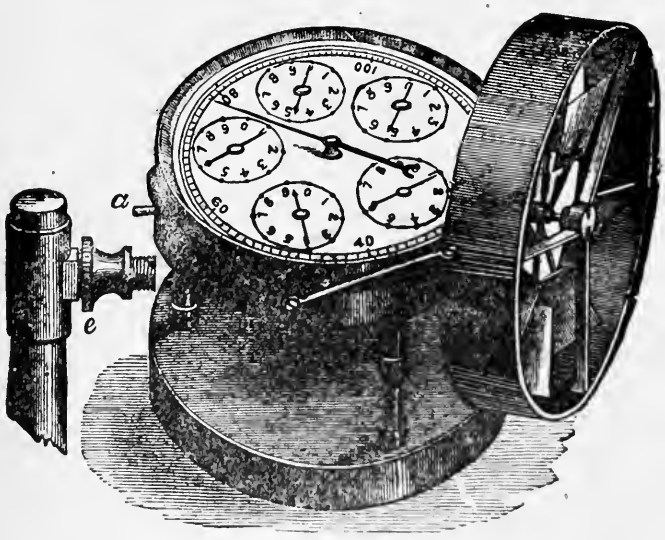
No. 14505.

14,500.	Biram's Anemometer, 6 inches diameter, reading to ten million feet, with disconnector, Fig. 1, ...	$40 00
14,501.	Biram's Anemometer, 5 inches diameter, same as 14,500, . .	39 00
14,502.	Biram's Anemometer, 4 inches diameter, same as 14,500, . .	37 50
14,505.	Biram's Anemometer, 12 inches diameter, reading to ten million feet, with disconnector, ...	45 00
14,506.	Biram's Anemometer, 6 inches diameter, same as 14,505, . .	40 00
14,507.	Biram's Anemometer, 4 inches diameter, same as 14,505, . .	37 50



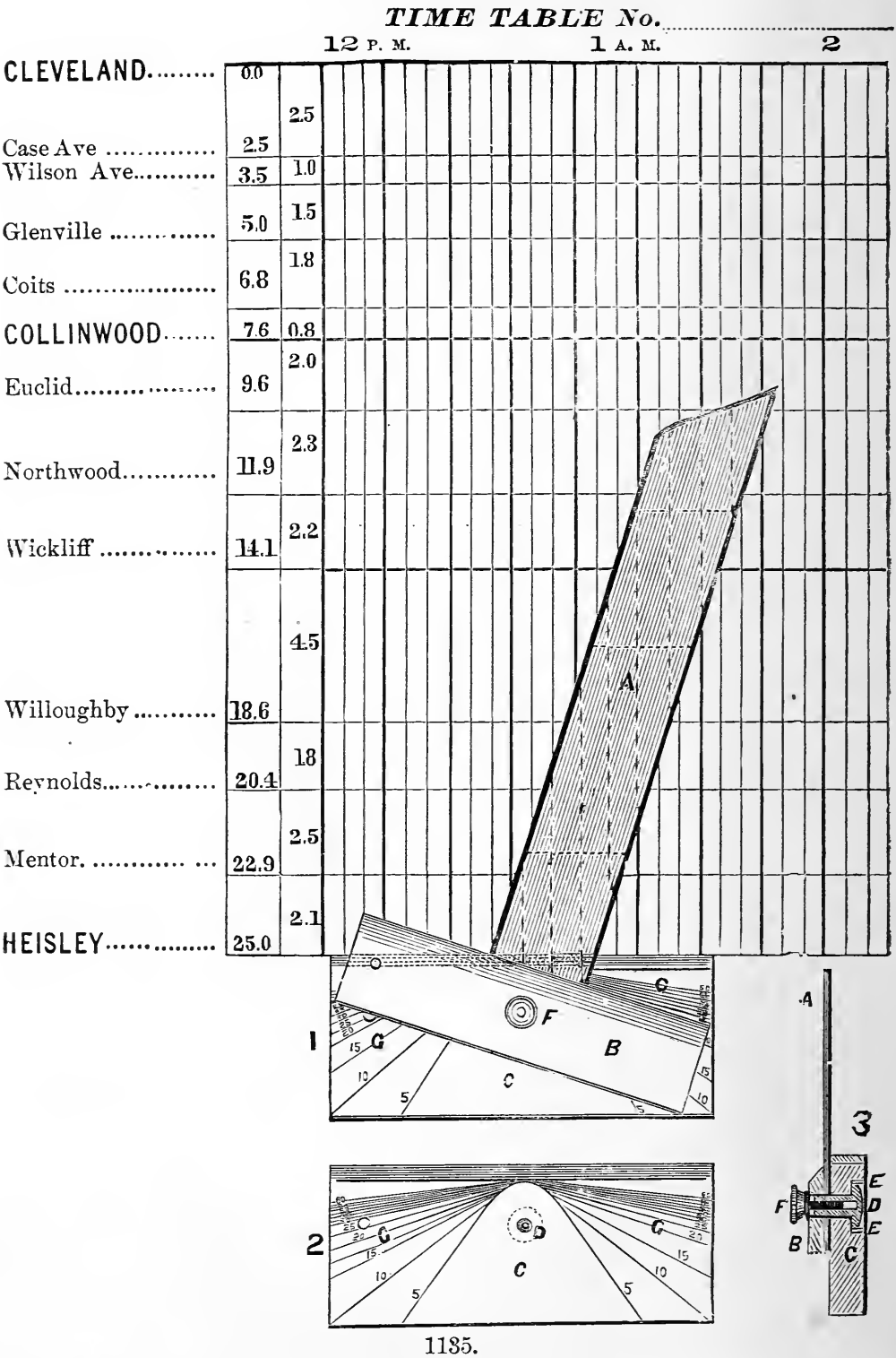
No. 14,508

14,508. BIRAM'S ANEMOMETER, 6 inches diameter, reading to 1000 feet, with disconnector, ... 25 00
14,509. BIRAM'S ANEMOMETER, 6 inches diameter, reading to 1000 feet, without disconnector, ... 22 50
14,510. BIRAM'S ANEMOMETER, 4 inches diameter, reading to 100 feet, . 20 00
14,511. BIRAM'S ANEMOMETER, same as above, with disconnector, . . 22 50



No. 14,515.

14,515. THE PORTABLE AIR METER, diameter of fan wheel 2¾ inches, with disconnector, which is extensively used for testing the ventilation of HOSPITALS, SCHOOLS and PUBLIC BUILDINGS, forms also, an admirable Pocket Anemometer for tourists. The indications are obtained by the revolution of a series of fans (similar to those of Biram's Anemometer) acting first, upon a long hand capable of recording the velocity of fifty feet per minute on the large dial, divided to 100 feet, and then successively, by a train of wheels on the indices of five smaller dials, recording respectively, 100, 1,000, 10,000, 100,000 and 10,000,000 feet, or 1,893 miles, ... 30 00
14,516. AIR METER, same as preceding, but reading only to 1,000 feet, . 25 00
14,517. WATCH ANEMOMETER, very small and sensitive, outside dimensions 2¾ in. in white metal hunting case, ... 40 00
14,518. WATCH ANEMOMETER, same as above, in silver hunting case, . 45 00



1185.

The above cut represents, Fig. 1, the "Speed Protractor," as set at a speed angle of 25 miles per hour, and part of a Chart Fig. 2 represents the lower head, C, with the speed scale, G, engraved on it. Fig. 3 is a cross section of the lower head, C, the upper and movable head, B, and part of the blade, A. The blade, A, is 42 inches long, made of hard rubber and backed with mahogany wood. The two heads, B and C, are made of steam-dried satin-wood and faced with ebony. Dimensions of lower head, C, 4x15 inches; of upper head, B, $2\frac{1}{2}$x$14\frac{1}{2}$ inches. D, E, F, Fig. 3, represent the fixed brass pivot and thumbscrew, for setting the instrument at any required speed.

1135. Hill's Railroad Time Charts.

The principal features of the Charts are:

1. The positively *mathematical correctness* of the spacing.
2. The *ease* with which the five minutes, half hour, and hour lines can be distinguished, as well as their perfect *clearness* and *cleanness*.
3. Their *enormous size* (28x50), admitting of larger hour-spaces than any chart at present in use.
4. The *excellence* of the *paper* on which they are printed, as well as its *peculiar tint*, rendering it peculiarly fit for night work, while its cardboard-like texture obviates the necessity for dampening and stretching, and the consequent distortion of the diagram.
5. Their *cheapness*, which enables us to furnish them to railroads in smaller quantities and at a lower price than they could be obtained by lithographic or any other process.

The "*Speed Protractor*," which is generally used with the Charts, needs hardly any recommendation. The *simplicity* of its *construction*, the *care* bestowed in its *manufacture*, its greater *accuracy* than that of the semicircular angle protractor, and its *low price*, speak for themselves.

The price of the Charts, without name of stations, station lines, and heading, is $12.00 per quire; complete and ready for train plotting, the scale of prices is as follows, viz.:

50 Sheets,	$50.00
100 do.	80.00
150 do.	110.00
200 do.	140.00
Speed Protractor,	10.00

In favoring us with an order for complete Charts, please send list of *stations* with intermediate *distances*, and *underscore* such stations as you may desire to have printed in *heavy type* on account of their importance.

The following is an extract from a letter of Mr. James Tillinghast, General Superintendent of the New York Central and Hudson River Railroad, to whose judgment Mr. Hill submitted both Charts and Protractor:

"NEW YORK CENTRAL AND HUDSON RIVER RAILROAD,
Gen'l Supt. Office, Albany, N. Y., Jan. 15th, 1876.

"ALBERT HILL, ESQ.:

"*Dear Sir*:—I am in receipt of yours of the 14th inst., with sample of diagram of Chart sheets. * * * I have not found any better plan to secure accuracy in forming the basis or proof of time tables, for the reason that it presents to the eye in a clear, condensed form, all the trains the schedule is to cover, and in such manner that the station figures are *accurately* indicated, and from which the figures for the printed form can be *readily copied*.

"Your plan of '*Speed Protractor*' is the *best* I have seen, and will be very useful in connection with the Charts, and I have no doubt that, with the facilities you mention for the production of charts *so accurately lined* as your process will produce, you will be able to secure orders. * * *

"Yours truly,

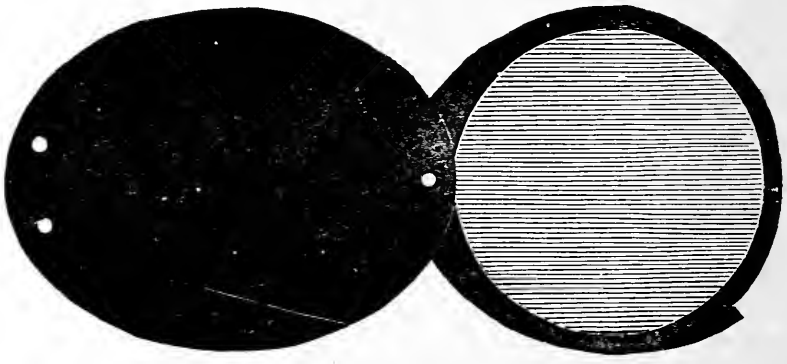
"JAMES TILLINGHAST."

The following is a list of some of the principal railroad companies by which these Charts have so far been adopted:

Pennsylvania Railroad.
Central Railroad of New Jersey.
Lake Shore and Michigan Southern Railroad.
Toledo, Wabash and Western Railway.
Cleveland, Tuscarawas and Wheeling Railroad, etc., etc.
Intercolonial Railway of Canada.
Boston and Maine Railroad.
Lehigh Valley Railroad.
Allegheny Valley Railroad.
New York and New England Railroad.
Louisville, New Orleans and Texas Railway.

If desired, we will send by mail, postage paid, a Chart of any of the above-named roads, as a sample.

POCKET MAGNIFYING GLASSES.



1138.

No.										Price.
1136.	Hard Rubber	case and	frame,	round form,	1	double convex	lens,	¾	in. diam.	$0.40
1137.	Do.	do.	do.	do.	1	do.		1	do.	.60
1138.	Do.	do.	do.	do.	1	do.		1¼	do.	.75
1139.	Do.	do.	do.	do.	1	do.		1¾	do.	1.25
1140.	Do.	do.	do.	do.	2	do.		1	do.	1.00
1141.	Do.	do.	do.	do.	2	do.		1¼	do.	1.50
1142.	Do.	do.	do.	bellows form,	1	do.		¾	do.	.30
1143.	Do.	do.	do.	do.	1	do.		1	do.	.75
1144.	Horn case,	German silver	frame,	do.	1	do.		¾	do.	1.00
1145.	Hard Rubber	case and	frame,	do.	2	do.		¾	do.	1.00
1146.	Do.	do.	do.	do.	2	do.		1	do.	1.25
1147.	Horn case,	German silver	frame,	do.	2	do.		¾	do.	1.50
1148.	Hard Rubber	case and	frame,	do.	3	do.		¾	do.	1.50
1149.	Do.	do.	do.	do.	3	do.			do.	1.75
1150.	Horn case,	German silver	frame,	do.	3	do.		¾	do.	2.00

EXTRAS TO TRANSITS.

Vertical Circle, 3½-inch diameter, vernier reading to five minutes,	8.50
Do. 4½ do. do. single do.	14 50
Vertical Arc, 6-inch diameter, divided on silver, with vernier, movable by tangent screw, reading to 30 seconds,	20.00
Clamp and Tangent Movement to Axis of Telescope,	8.00
Level on Telescope, with ground bubble and scale,	15.00
Rack and Pinion Movement to Eye-glass,	5.00
Sights on Telescope, with folding joints,	9.00
Sights on Standards at right angles to Telescope,	9.00
Jointed Tripod Legs, for Mining Engineering,	6.50
Adjustable Stadia Hairs for Telescope,	10.00
Plated Reflector for Graduations,	4.00
Plated Reflector for Cross Wires,	4.00

EXTRAS TO COMPASSES.

Jacob Staff Mountings, brass head,	5.00
Jacob Staff Mountings, steel shoe,	.75
Needle and Cap,	3.50
Centre Pin,	1.00
Compass Glass,	1.00
Chamois Skin,	.50

CHAPTER XIV.

CATALOGUE OF SCIENTIFIC BOOKS.

ARCHITECTURE, CARPENTRY, AND BUILDING.

ABERDEEN. Grecian Architecture. By Earl of Aberdeen. (Weale's Series), ... $0.40

ALLEN. Cottage Building. By C. B. Allen. (Weale's Series), . . .60

ALLEN. Rural Architecture; being a Complete Description of Farm-houses, Cottages, and Out-buildings. By L. F. Allen. 12mo, . . 1.50

ARCHITECT'S (The) Guide; or, Office and Pocket Companion, for Architects, Engineers, etc. By W. D. Haskell, G. Rennie, F. Rogers, and P. Thompson. 1 vol. 16mo, cloth, ... 3.00

ATWOOD'S Country and Suburban Residences, ... 1.50

———Modern American Homesteads. 46 plates, ... 3.50

AUSTIN. A Practical Treatise on Calcareous and Hydraulic Limes and Cements. By J. G. Austin. 1 vol. 12mo, cloth. London, 1862, . . 2.00

BARNARD. School Architecture. By Henry Barnard. 3d edition. 1 vol. 8vo, cloth. New York, 1849, ... 2.00

BAUMAN. The Art of Preparing Foundations for all kinds of Buildings. By Frederick Bauman, ...75

BELL. Carpentry Made Easy. By W. F. Bell. 1 vol. 8vo, . . . 5.00

BICKNELL'S PUBLIC BUILDINGS, ... 3.50

——— Street, Store, and Bank Fronts, ... 4.00

——— School-house and Church Architecture, ... 3.00

——— Stables, Out-buildings, Fences, etc., ... 2.50

——— Specimen Book of 100 Architectural Designs, ... 1.00

BICKNELL'S VILLAGE BUILDER. Elevations and Plans for Cottages, Villas, Suburban Residences, Farm-houses, Stables, and Carriage-houses, Stone Fronts, School-houses, Churches, Court-houses, and a Model Jail. 4to. New edition, with supplement, ... 10.00

——— Detail Cottage and Constructive Architecture, ... 10.00

———. By J. Blenkarn. 1 vol. 8vo. London, 1865, ... 9.00

BOWLER. Chapel and Church Architecture, with designs for Parsonages. By Rev. G. Bowler. Folio, illustrated, ... 7.50

BROOKS. Erection of Dwelling-houses, with Specifications, Quantities of Materials, etc. 27 plates. By S. H. Brooks. (Weale's Series), . . 1.00

—— New Designs for Chimney Pieces, with Elevations, Sections, Profiles, and Plans. By S. H. Brooks. 6 parts, royal 4to. London, . . 15.00

BULLOCK. The American Cottage Builder. By J. Bullock. 1 vol. 8vo, cloth. Philadelphia, 1869, ... 3.50

——— The Rudiments of Architecture and Building. By J. Bullock. 8vo, cloth, ... 3.50

BURN. Model Designs for Mansions, Villas, Cottage Residences, Park Entrances and Lodges, being Plans, Elevations, Sections, Detailed Drawings, and Descriptive Specifications. Arranged by Robert Scott Burn. 1 vol. 4to, half morocco, ... 15.00

BURNELL. Rudimentary Treatise on Limes, Cements, Mortars, Concretes, Mastics, Plastering, etc. By George R. Burnell. Fifth edition, with Appendices. (Weale's Series), ...60

BURY. Styles of Architecture. By T. Bury. (Weale's edition), . . .80

BUTLER. Ventilation of Buildings. By W. F. Butler. With illustrations, .50

CAMPIN. On the Construction of Iron Roofs, a Theoretical and Practical Treatise. By Francis Campin, C. E. With wood-cuts and plates of roofs lately executed. Small 4to, cloth. New York, 1868, . . $2.00

CARPENTERS' and Builders' Guide, ... 1.00

CLEVELAND AND BACKUS. Cottage and Farm Architecture, . . 4.00

CROFF. Model Suburban Architecture, embodying Designs for Dwellings of Moderate Cost, together with elaborate and extensive Villas, etc., etc. By C. B. Croff, Architect. 1 vol. 4to. 1870, . . . 5.00

CROFT'S Designs for Front Entrance Doors. 22 large plates, . . . 5.00

CUMMINS AND MILLER. Designs for Street Fronts, Suburban Houses and Cottages. By M. F. Cummins and C. C. Miller, Architects. 1 vol. large 4to, cloth. Troy, 1868, ... 10.00

——— Modern American Architecture, containing designs and plans for Villas, Farm-houses, School-houses, Cottages, City Residences, Churches, etc. Also Trussed Roofs, Interior Stone Finish, and many exterior details. By M. F. Cummins and C. C. Miller, Architects. 1 vol. 4to, cloth. Troy, 1868, ... 10.00

CUPPER. The Universal Stair-builder, being a new Treatise on the Construction of Stair-cases and Hand-rail. By R. A. Cupper. 4to, . 7.50

DEAN. A series of selected designs for Country Residences, Entrance Lodges, Farm Offices, Cottages, etc. By G. A. Dean. With numerous colored plates. 4to. London, ... 15.00

DE GRAFF. The Modern Geometrical Stair-builders' Guide. By S. De Graff, Architect. 4to, illustrated. Philadelphia, 1868, . . . 5.00

DEMANET. Guide Pratique du Constructeur Maconnerie. By A. Demanet. 1 vol. 12mo, paper, and 1 vol. plates. Paris, 1864, . . 2.00

DENTON. The Farm Homesteads of England; a collection of plans of the most approved specimens of Farm Architecture. Edited by J. Bailey Denton, C. E. 2d edition. 4to, cloth. London, 1865, . . 25.00

DESIGNS (Original) for English Cottages, containing Views, Elevations, Plans, and all Detail Drawings, etc., etc. By a Practical Surveyor and Builder. 1 vol. 4to. London, 1866, ... 10.50

DICTIONARY of Terms used by Builders, Architects, etc. (Weale's Series), ... 2.50

DOBSON. Brick and Tile Making. By E. Dobson. New edition, revised by Robert Mallet. London, 1868. (Weale's Series), ... 1.20

——— Foundations and Concrete Works. By E. Dobson. (Weale's Series), .60

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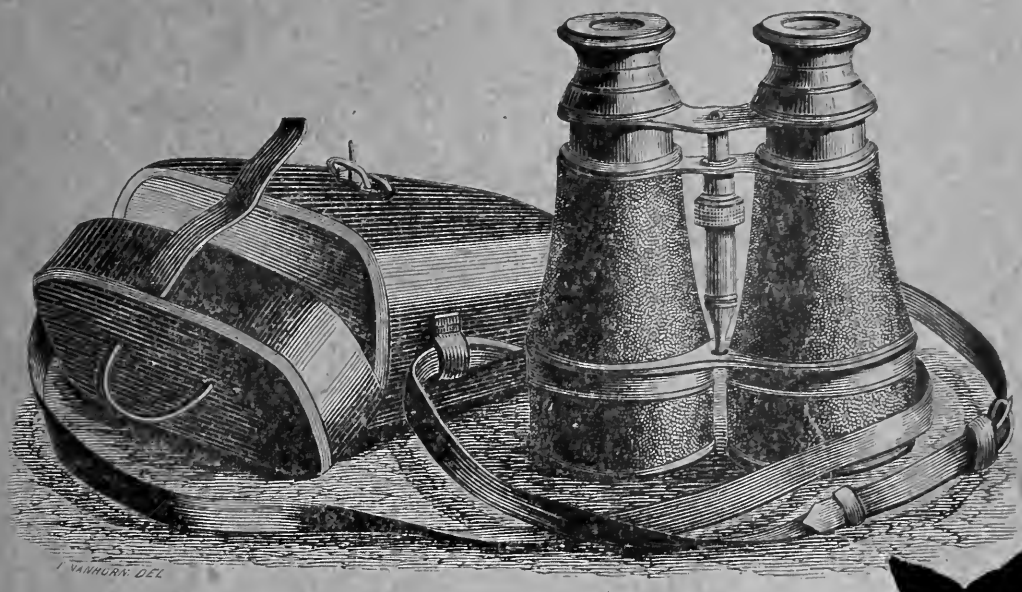

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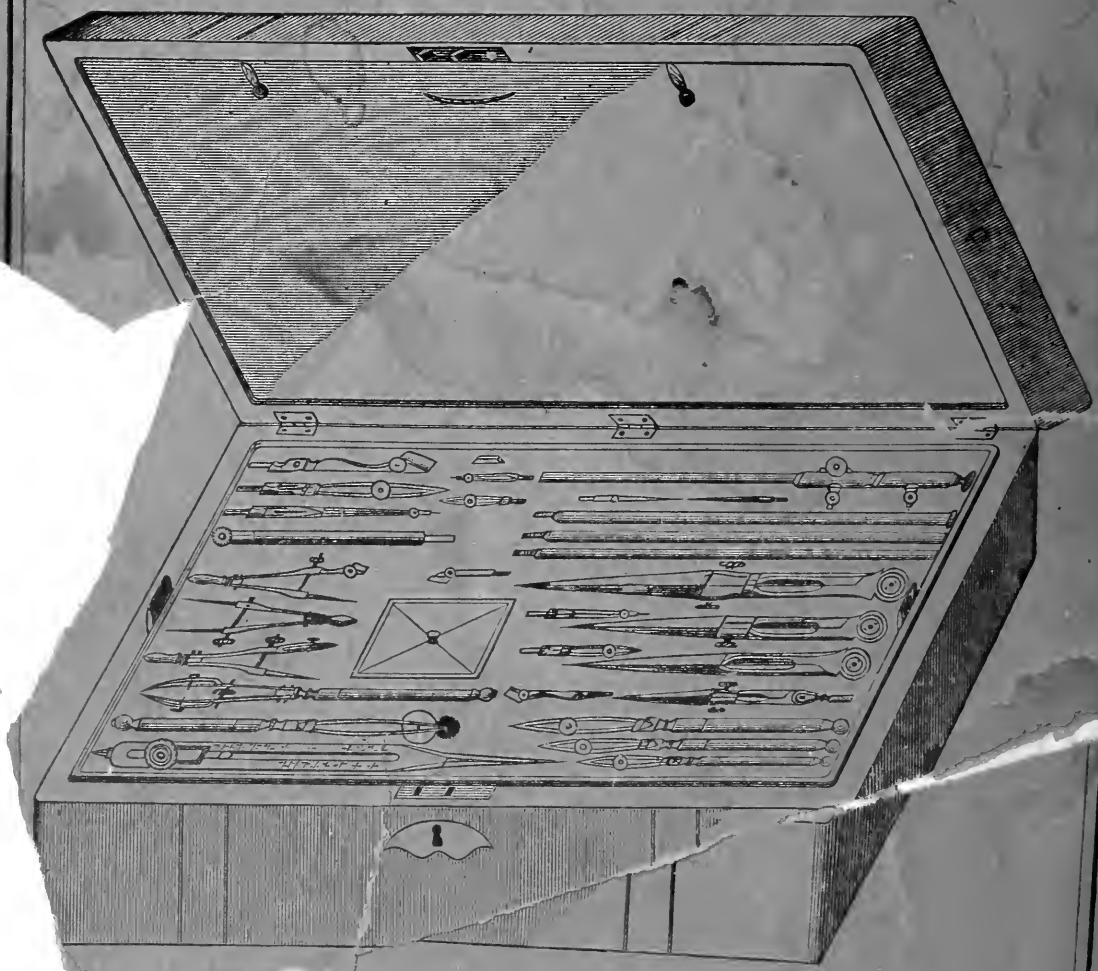

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